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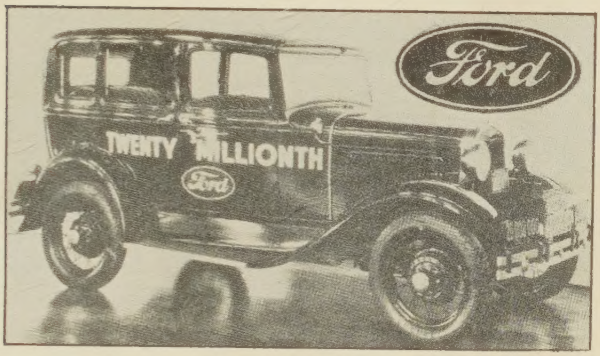
MODEL A FORD



With 35 Charts and Drawings.
By Victor W. Page

COMPLETELY ILLUSTRATED DESCRIPTION AND INSTRUCTIONS

FOR CARE AND MAINTENANCE OF MODEL A FORD AUTOMOBILES AND MODEL A TRUCKS

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NOTICE

This book originally published in 1928 when the Model "A" Ford was popular has been reprinted as a result of public demand.

There are still thousands of Model "A" Fords in service and this book will enable any owner to better understand the operation of the famous Model "A."

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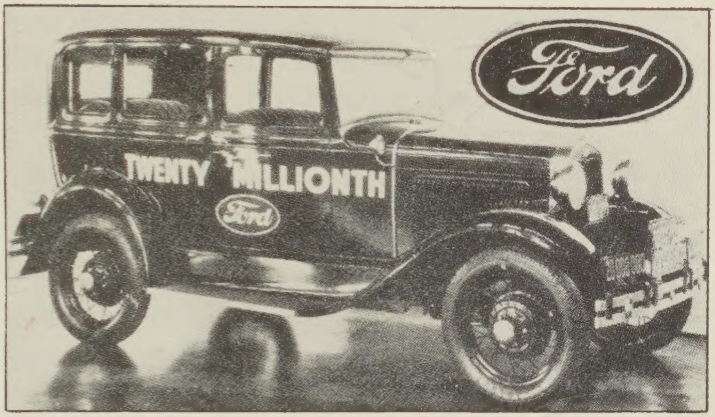


The new Ford is a car that conforms more to standard practice than the Model T, and the well-known features of that car, the flywheel magneto and the planetary transmission, are not found in the new model, which has a standard gear shift and a conventional electrical system. The body lines of the new cars are a marked improvement over those found in the old car. The side view of the Tudor sedan, a very popular model, shown at Fig. 1, is typical of the graceful proportions of the entire line. The front view of the phaeton, shown at Fig. 2, shows the new radiator design and lamp hook-up.

The Model A has a four-cylinder engine of 3⅞ in. bore and 4¼ in. stroke, which gives a piston displacement of 200.5 cu. in. The engine is oiled by the circulating splash system, the pump delivering into the valve

chamber, from which the oil flows by gravity to each of the main bearings. Connecting rod heads are provided with dippers which splash oil from troughs in the lower part of the crankcase to all of the other parts of the engine requiring lubrication. The transmission, which is of the regular sliding pinion type, has gears made of

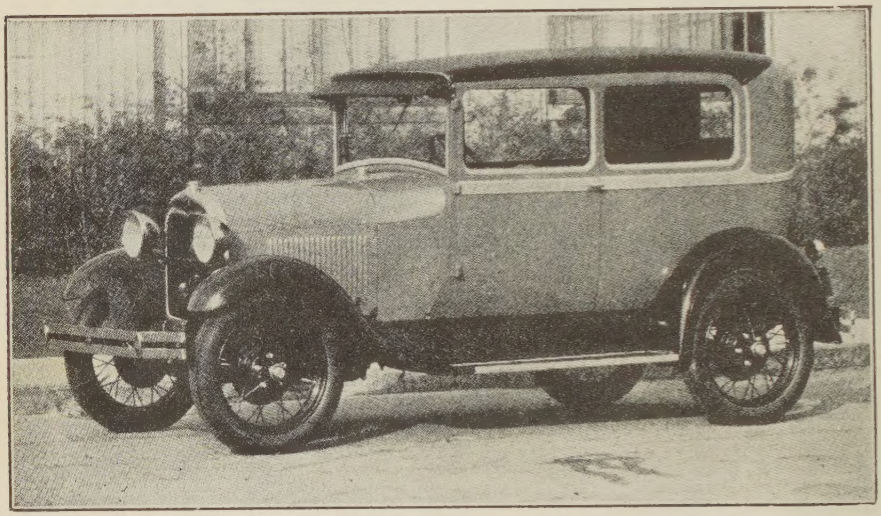


Fig. 1.—Side View of Ford Model A Tudor Sedan Showing Graceful Body Lines and Modern Appearance.

chrome steel. Four-point suspension is used for the engine, the rear support brackets on the flywheel housing bolting directly to the frame side members, thus forming an additional cross-member, while at the front the engine is supported on a rearward extension, in the form of an inverted channel, of the frame front cross-member. As has been mentioned, the clutch and transmission are similar in design to the corresponding units used in the Lincoln, the transmission being of the three-speed, standard-shift type, and the clutch a multiple disk, dry design.

Drive to the rear axle is by an inclosed propeller shaft with ball-joint at the forward end, to the propeller-shaft-tube member of which the diagonal radius rods from the rear axle housing are secured. The rear axle is of three-quarter floating type. Both the generator and the starting motor are located on the left side of the engine (looked at from the rear), the former being driven by the V-type fan belt, while the latter drives to the flywheel. The attention of the reader is directed to the

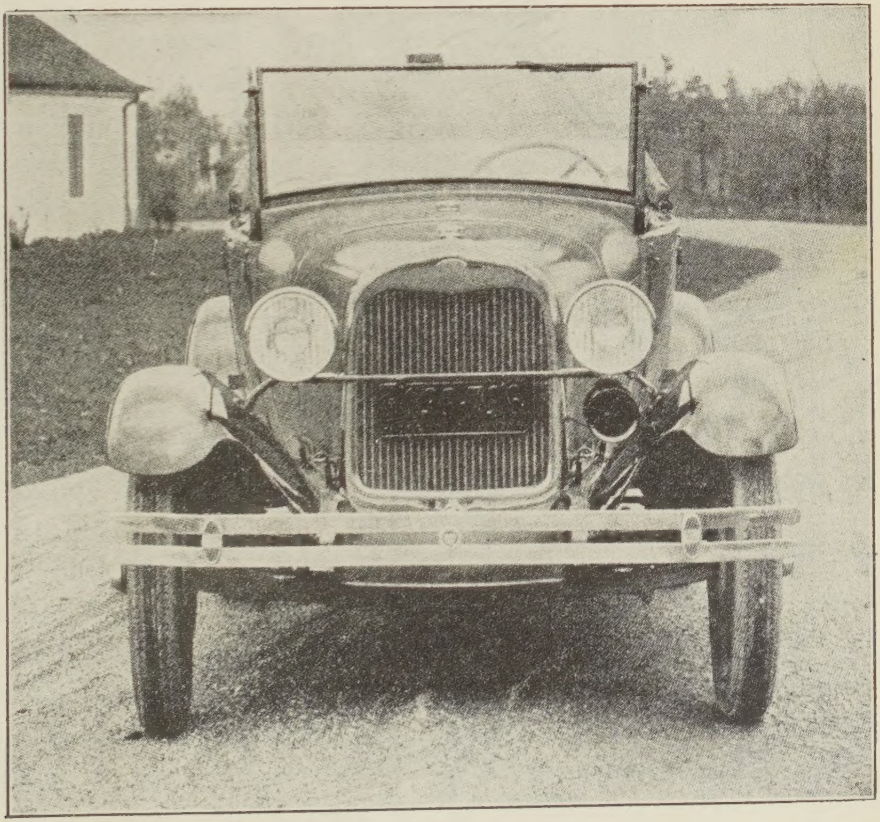


Fig. 2.—Front View of Ford Model A Phaeton Showing Radiator Design, Full Crown Fenders and Lamp Installation.

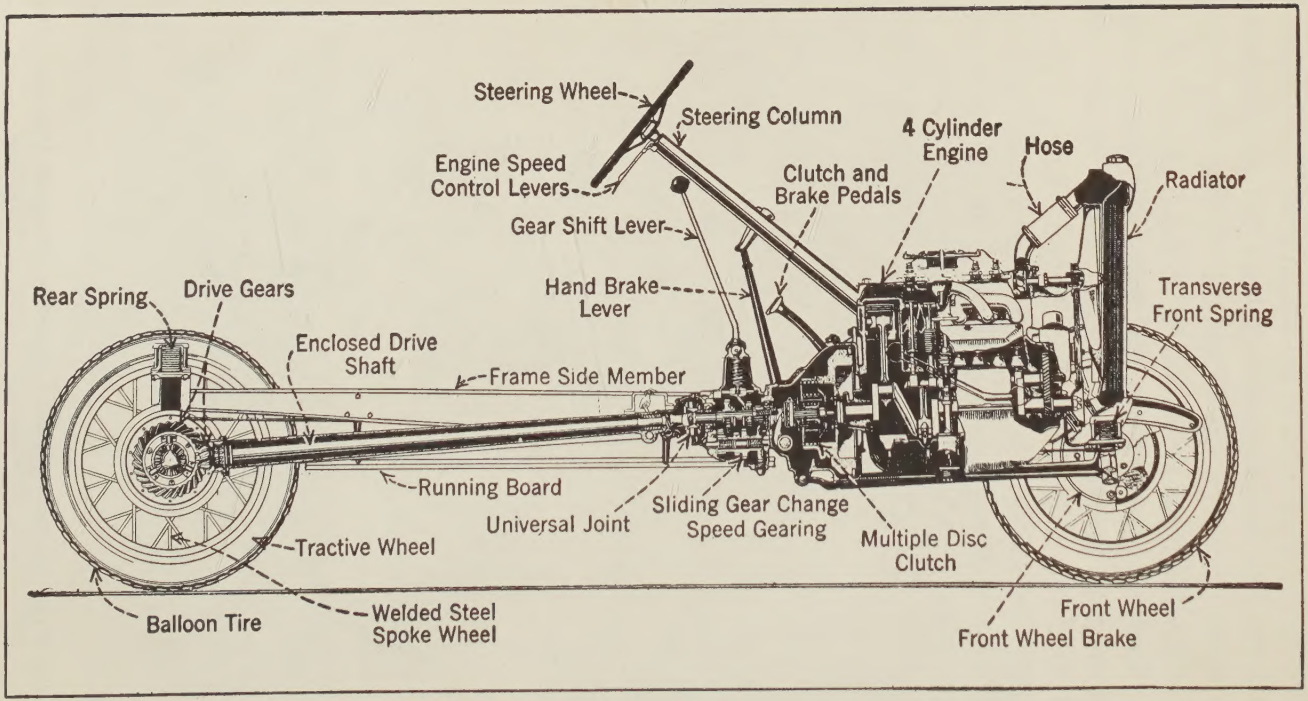


Fig. 3.—Sectional View of Ford Model A Chassis Showing Power Plant in Part Section, also Clutch, Three Speed Sliding Gearset and Shaft Drive to Rear Axle.

sectional view of the chassis shown at Fig. 3, as this clearly shows the main details of the chassis. As can be clearly seen, three cross-members are used in the frame. These are all of the gusseted type, the front member having the form of a double channel, while the others are of the regular channel type. In contrast to statements recently made in various automotive publications, the frame members are riveted together and not welded. The cross-members, of course, are supplemented by the rear engine supports, which virtually form an additional cross-member. There is also a pressed steel member tying together the rear bumpers. An outward bulge of the rear part of the frame is also noticeable.

Radius rods for the front axle have also been redesigned. Like those for the rear axle, they are of the tubular type with an elliptic cross-section, and they connect at the rear end to the bottom of the transmission case through a ball joint. At the front end, they connect to the axle by means of yoke-and-pin joints, the pins passing vertically through eyes in the yoke and the front axle. Wire wheels of the same type as used on the last Model T series are standard equipment, a spare wheel being included. These wheels take 29 x 4.50 in. balloon tires.

The Model A Ford Bodies.— Bodies are of composite construction. The body and pillars, and the roof side rails are of wood, sheet-steel-clad, and are covered with sheet-steel panels. On the closed models complete body side panels are built up and flash-welded onto the rear body panel. Tops are fabric-covered. Cowls are made in three pieces, the top part being formed by the gasoline tank, to which the side panels are flash-welded. Fenders

are full-crowned, belt lines are higher, and the wheelbase is longer.

A new instrument panel is adopted. This is roughly of diamond-shape, with the dash gasoline gage, reading in quarters of tank capacity, at the top, the speedometer at the bottom, the ammeter at the right, the ignition lock at the left, and the instrument board lamp in the center. The ignition lock is of the Electrolock type, grounding the distributor, the connecting cable being enclosed in a metal conduit. Spark and throttle control levers are still mounted on the steering column below the wheel, but the former quadrants have been eliminated, and a foot accelerator is provided. Above the wheel on the steering column is mounted the light control lever. Double-filament, double-contact bulbs are used in the bullet-type headlamps.

A combination tail and stop light is standard equipment, as are also Houdaille shock absorbers, front bumpers and rear bumperettes. The latter attach to both the frame and the body and are curved to carry out body lines. They, as well as the front bumpers, are assembled on the cars before the body is put on, but are easily removable. Additional items of equipment are an automatic windshield wiper, a swinging type one-piece windshield with ventilating ports in the top of the cowl exposed when opening the windshield, a speedometer, which is driven from the front end of the propeller shaft, and a Sparton horn which is mounted between the radiator shell and the left fender below the headlamp. The crank handle is removable, whereas in the Model T it could not be removed. The running boards are of steel construction, rubber-covered, with aluminum bindings and concealed screws.

Interior finish of the cars is also decidedly improved. On the open models and the cabriolet, unpleated brown imitation leather is used for the upholstery, the seat cushions having a single pleat running lengthwise of the cushion, about two-thirds of the way forward. In the closed cars cloth upholstery is used, with doors and side walls trimmed in the same materials, the doors being fitted with pockets also made of pleated upholstery material. Door controls are of the remote type, operating by lifting the lever, rather than by turning it. Windows are crank-operated, and door snap locks are provided inside the closed cars. On the cabriolet a regulation roll-up type of rear curtain is provided. A choice of four colors is being offered, namely, Niagara blue, Arabian sand, Dawn gray, and Gunmetal blue. The belt and reveals are in all cases in contrasting colors and the bodies are attractively striped. All cars are finished in pyroxylin lacquer. The fenders are of the full-crowned type and harmonize with the body lines.

Seat cushions are deeper and softer than those of the Model T. Door handles and window lifts are nickel-plated. The speedometer, gasoline gauge, a meter and ignition lock are mounted on an instrument panel of satin-finish nickel and are illuminated by a lamp mounted in the center. The headlamps and radiator shell are nickel-plated on all exposed surfaces. The closed cars have the cadet type of sun visor and a crown roof. Unusually narrow front pillars, together with steel body construction, assure clear vision without impairing body strength.

As will be seen in the mechanical descriptions to follow, the car should be quiet. The body design works to that end, and the very flexible spring construction, work-

ing in conjunction with hydraulic shock absorbers, minimizes road shocks, thus lessening body noises. Care has been exercised in the design of the bodies to prevent squeaks, rattles and drumming sounds.

The Ford Model A Engine.—The engine of the Model A is of brand-new design, and none of its major parts apparently are interchangeable with those of the Model T. For instance, the crankshaft, while still of the three-bearing type, is counterbalanced by machining the first, third, fourth and sixth crankcheeks in cylindrical form.

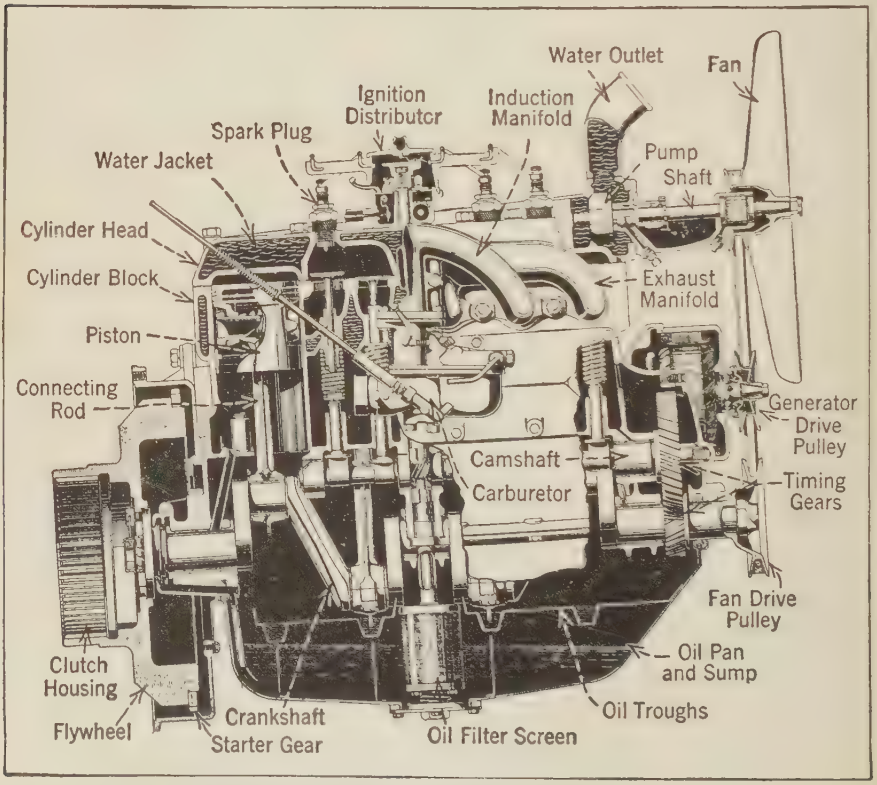


Fig. 4.—Part Sectional View of Ford Model A Engine Showing Design of Important Internal Parts.

Connecting rods are longer and lighter. The sectional view of the engine at Fig. 4 shows the sturdy and simple mechanical construction of the engine very clearly, while the various important components of the power plant shown in illustrations on Fig. 5 serve to make the design of these parts clearer to the reader. The power and accelerating qualities of the engine are remarkable for a low-priced car. In tests in high gear, it is stated that a Model A with a two-door sedan body, with two passengers, is said to have accelerated from 5 to 25 m.p.h. in 8½ seconds, and the maximum road speed varies between 55 and 65 m.p.h. Some road tests have shown a speed in excess of 65 m.p.h., but, quite naturally, the maximum speed which can be attained varies with road conditions, the style of body and the load carried. At 2200 r.p.m. the four-cylinder engine develops 40 hp. on the brake. While the rate of gasoline consumption will vary widely with service conditions, the car will make between 20 and 30 miles per gallon.

A turbulence type of cylinder head is now used and a higher compression ratio provided for. Spark plugs are mounted in the center of the combustion space, and are no longer of the ½ in. type but are ⅞ in. in diameter with 18 threads per inch, as in other makes of cars. Camshafts are of the three-bearing type, but are new in design, and have the drive gear for the vertical accessories shaft machined at the center. Of course, the engine is still of the L-head type. Camshaft drive is by a non-metallic gear, with no idler. The smooth operation and unusual accelerating qualities of the car are due, to a great extent, to the use of aluminum pistons. A three-bearing crankshaft is used, which is provided with circular disks concentric with the shaft in the places of the

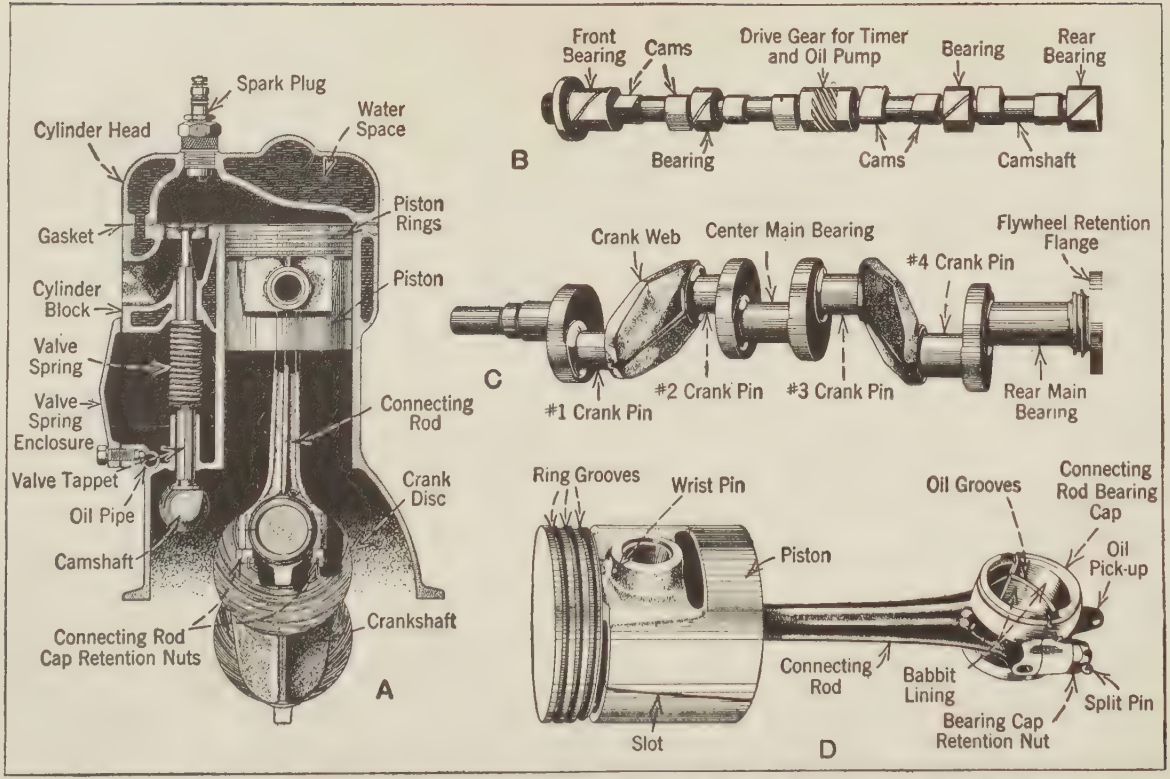


Fig. 5.—Diagrams Showing Important Structural Parts of Ford Model A Engine. A—Sectional View of Cylinder Showing Valve Action, Piston and Connecting Rod and Crankshaft and Their Relation. B—Camshaft Has Large Bearing Area. C—The Crankshaft Has Disc Webs and Is a Three Bearing Type. D—Piston and Connecting Rod Assembly.

usual short arms. This shaft is statically and dynamically balanced, and as a result of the relatively low speed at which the full power is developed, the engine runs with exceptional smoothness. Cam contour and valve clearances have been so worked out that—with non-metallic timing gears—an unusually quiet power-plant results.

Ford Model A Lubrication and Cooling Systems. — Engine lubrication is unique and of distinctive Ford design. The system involves pump circulation, splash and gravity feed. Oil from the pump is delivered to the valve chamber, from which it flows by gravity to the main bearings of the crankshaft. There is an oil dipper on the cap of each connecting rod, which splashes the oil over the bearings and distributes it to all interior parts of the engine. This is shown in the sectional view of the engine on Fig. 6. Lubrication is by force fed to the main bearings, and by splash to all other parts. The oil pump is located at the lowest point of the pressed steel oil pan, a cover below it permitting of its removal without removing the oil pan. Oil is also delivered by pressure to the valve chamber on the right into the sump through a large external pipe.

Cooling is by a centrifugal water pump mounted on the cylinder head and combined with the fan. The cylinder head is provided with a riser to prevent the pocketing of steam in the rear end of the block. Water enters the block centrally at the left side. A two-bladed fan is used, driven by a V-belt, the belt also driving the generator, which is mounted forward on the left side of the engine. Adjustment is by swinging the generator to tighten the fan belt. The details of the cooling system, with all important parts designated, are shown in Fig. 7.

Carburetion and Ignition Systems.—Two of the auxiliaries which have a material influence on engine operation are the carburetion and ignition systems. The fuel

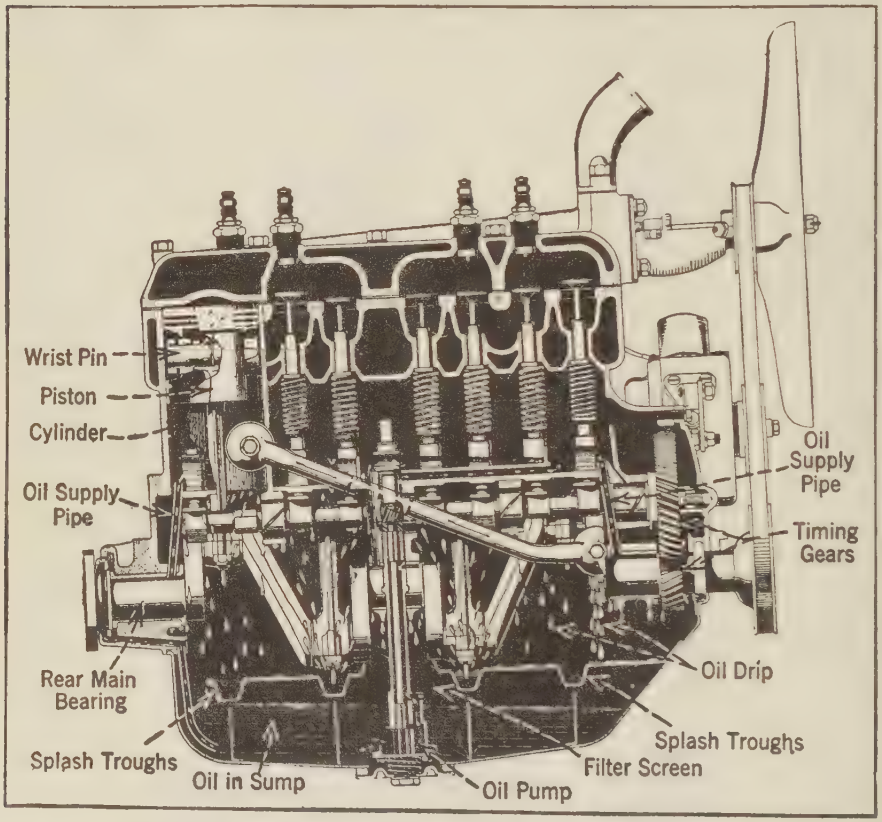


Fig. 6.—Sectional Side Elevation of Ford Model A Motor Showing Oil Pump and Method of Lubrication.

supply and carburetor of the Ford Model A engine are clearly shown at Fig. 8. The fuel tank is part of the body, being placed under the cowl, with the filler cap projecting. It includes a filter screen and fuel gauge. The capacity of the tank is 10 gallons. The carburetor is a

Zenith 1″ vertical, with choke and needle adjustment rod on dash. The hot spot ram's horn type induction manifold is clearly shown. The fuel system, with its gravity

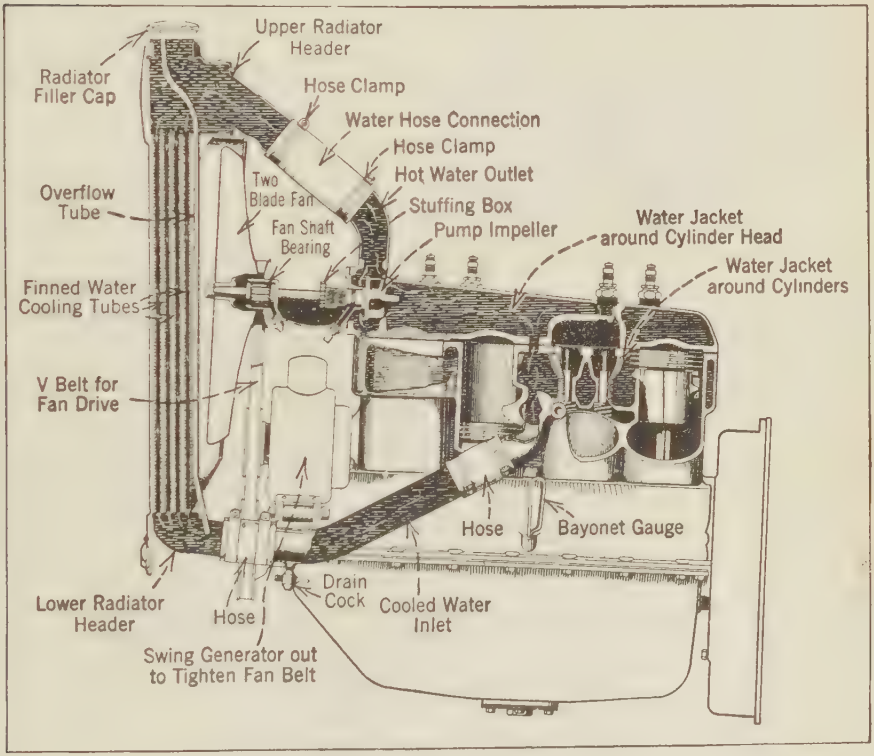


Fig. 7.—Sectional Side Elevation of Ford Model A Cooling Method Which Is a Combined Pump and Thermo-Syphon System.

feed and efficient carburetor, is comparable to that of the highest-grade cars.

The electrical system is illustrated in Fig. 9 and is of the usual standard design. The ignition system is of conventional modern design, the time-honored four coils and timer of the old Model T being done away with. One

ignition coil is used, and this is inclosed in a waterproof case. The distributor is located on the top of the engine, thus making it readily accessible and protecting it from

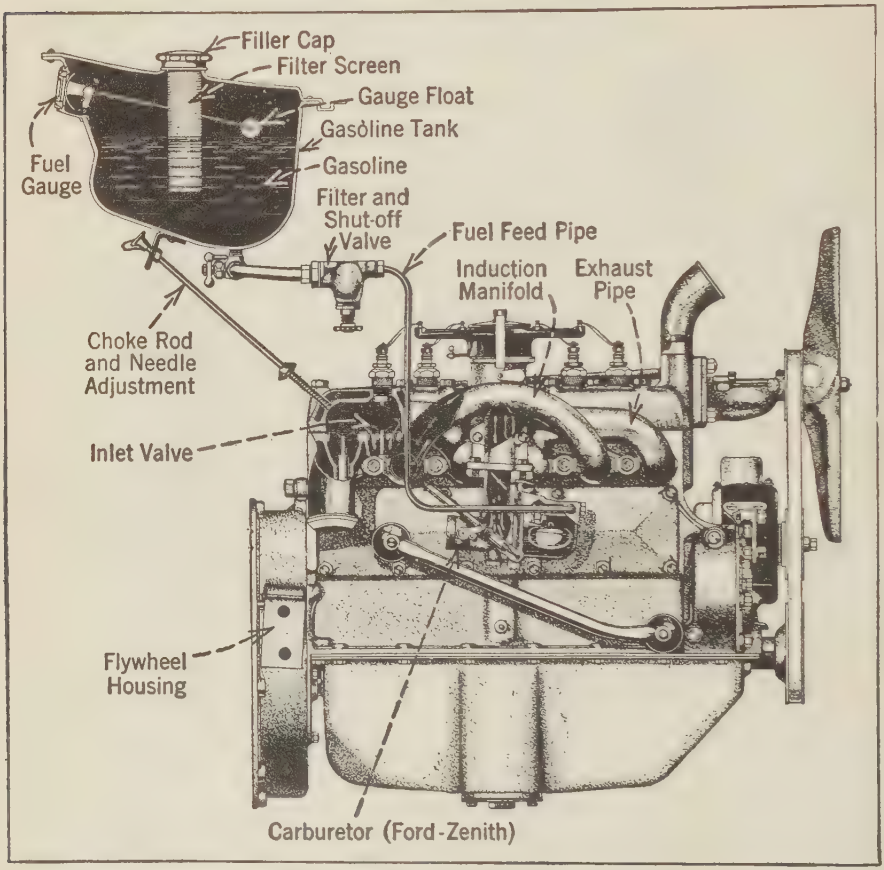


Fig. 8.—The Ford Model A Fuel System and Carburetor Installation.

oil and moisture. Connections from the distributor to the plugs are made by short bronze springs. A coincidental lock is placed in the ignition circuit. This not only replaces the regular ignition switch, but in the "off" position it grounds the entire circuit. A steel conduit

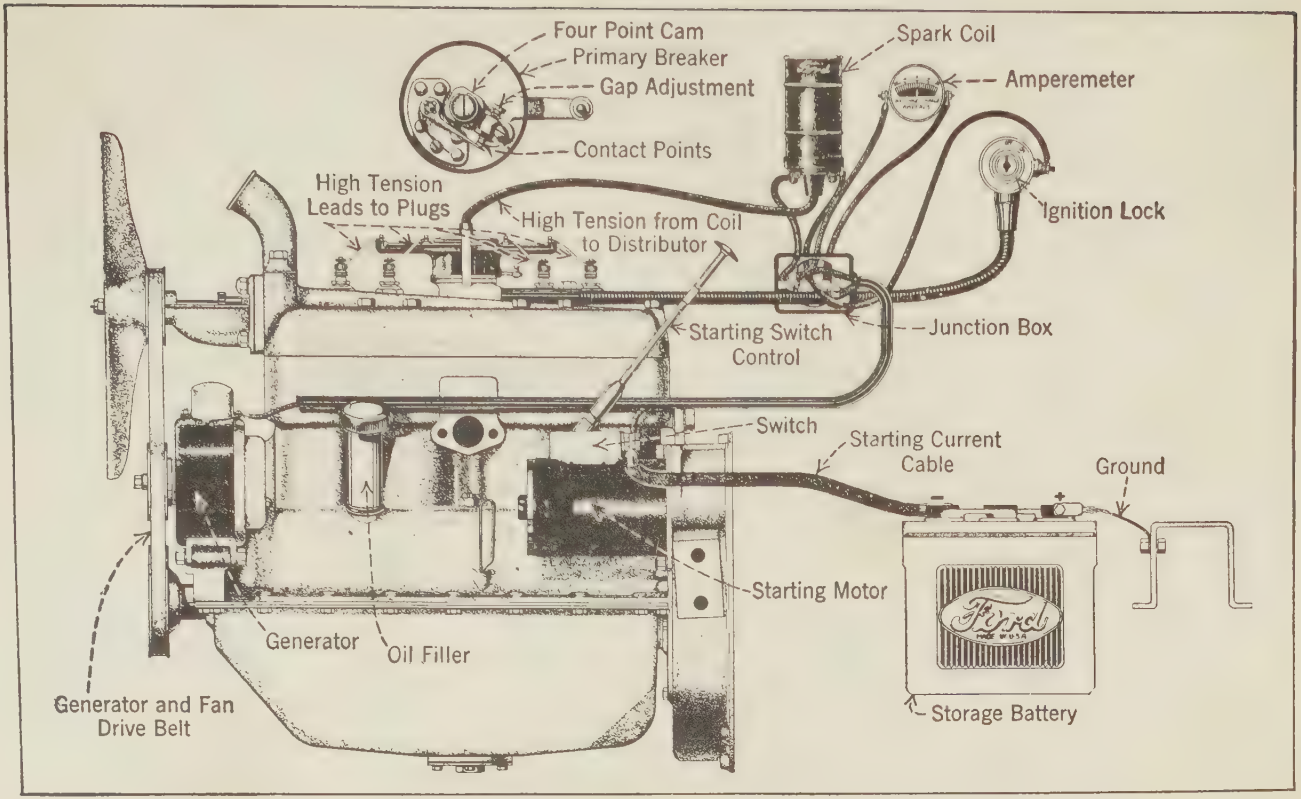


Fig. 9.—Ignition and Starting System of the Ford Model A Car. Note Construction and Location of Distinctive Ignition Distributor.

leading from the switch to the distributor protects the primary wire. This wire is grounded to the distributor casing, thereby making it impossible for anyone to wire around the device.

As has been mentioned, the generator, which is of Ford design, is driven by the fan belt. The starter is conventional and is mounted on the front of the flywheel housing on the side opposite to the generator. The ignition system is of American Bosch manufacture, but has the Ford name stamped on its units. The new distributor is mounted on top of the cylinder head, where it is driven by a vertical shaft, gear-driven from the center of the camshaft, the lower end of the vertical shaft driving the oil pump.

The cover for the new distributor is of molded composition, and is unique in that it has extensions running about 4 in. fore and aft over the cylinder block. Incased in these extensions are the leads for the various spark plugs. These leads are brought to the top of the extensions, where short brass strips are fastened down with round finger nuts. The other ends of these strips attach directly to the plugs. The coil for the new ignition system is mounted on the front of the dash.

Transmission System and Brakes.—The car has a three-speed-and-reverse selective sliding gear transmission with standard gear shift. The main shaft runs on ball bearings, while the gear cluster on the stationary secondary shaft is mounted on roller bearings, only the reverse idler having a plain bearing. This construction will at once be recognized as unusual in the lower-priced class. All gears are made of heat-treated chromium steel. In conjunction with this transmission, use is made of a

multiple disk dry clutch, with four driving and five driven disks. This design is comparable with transmissions found in cars selling at ten times the price of the Ford Model A, and is shown in Fig. 10. The steering gear is

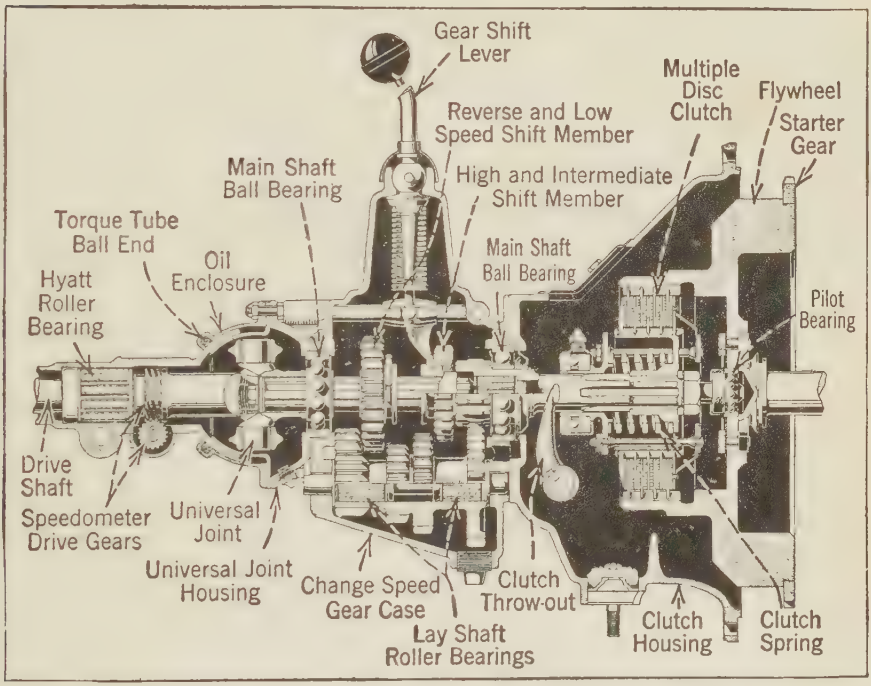


Fig. 10.—Sectional View of Ford Model A Multiple Disc Clutch and Three Speed Sliding Gear Transmission. Note Liberal Use of Anti-friction Bearings.

of the irreversible wheel and sector type and is shown at Fig. 11. The housing of the steering gear is of forged steel and has the tubular steering column welded to it. The ratio of the steering gear is 11¼ to 1. The steering wheel is of large diameter and is made entirely of steel, covered with hard rubber. The lighting switch and horn button are conveniently located on top of the wheel.

As formerly, torque tube drive is used. This torque

tube is tapered from about the middle of its length forward to the universal joint housing, and is bolted to the axle housing at the rear. Radius rods are of hollow elliptic section and connect by a ball joint to the torque

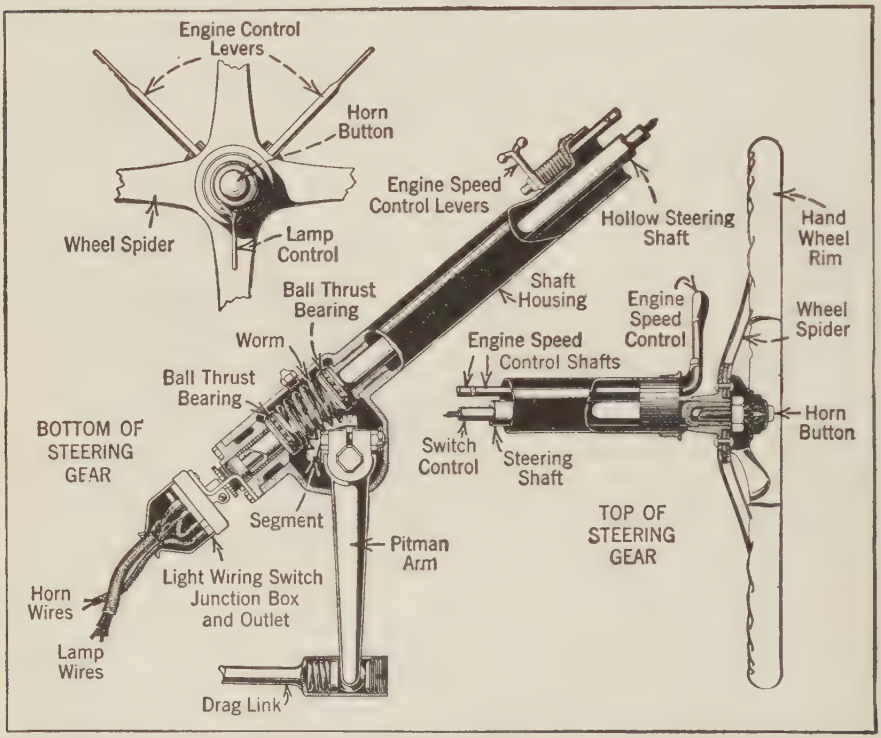


Fig. 11.—The Ford Model A Steering Gear is a Non-Reversible Worm and Segment Type.

tube immediately back of the transmission. A built-up rear axle housing is used, with the two sides of the housing bolted to the central cylindrical part inclosing the differential and drive gears. Two large, hollow-head plugs are used for filling with oil and draining respectively. Axle shafts are keyed to the wheel hubs. There

is no support for the axle shaft inside of the axle housing, but the load is taken by the axle housing itself from the wheel hubs directly, the latter being mounted on pilot roller bearings on case-hardened steel sleeves pressed onto the ends of the housing. The construction of the driving gear and differential assembly can be easily determined by examination of the illustrations in Fig. 12, while the rear wheel hub and bearing construction are easily determined by consulting the sectional view at Fig. 13.

A three-quarter floating rear axle is employed, and the axle shafts carry none of the weight of the car. The axle housings are made entirely of steel and are built up by welding steel forgings to steel tubing. The differential housing, to which these axle housings are bolted, is made of rolled channel steel. The wheels are carried on roller bearings on the axle housing, hence the shafts are not called upon to carry the weight of the car. All bearings in the rear axle are of the roller type, and the drive is by spiral bevel gears. The wheels, which are commonly referred to as wire wheels, are really steel spoked wheels. Each wheel is assembled by welding and becomes one piece of metal. This prevents the spokes from coming loose, and each spoke has a tensile strength of 4,000 lbs. As the outside spokes do not cross, and as there are only 30 spokes in each wheel, the wheels are particularly easy to clean.

Of interesting design are the mechanical four-wheel brakes. These are of the internal, two-shoe type and are self-centering. Smooth action and ease of adjustment are assured. All adjustments are made from outside, without removing any parts and without special tools. Both the brake pedal and the lever operate all four

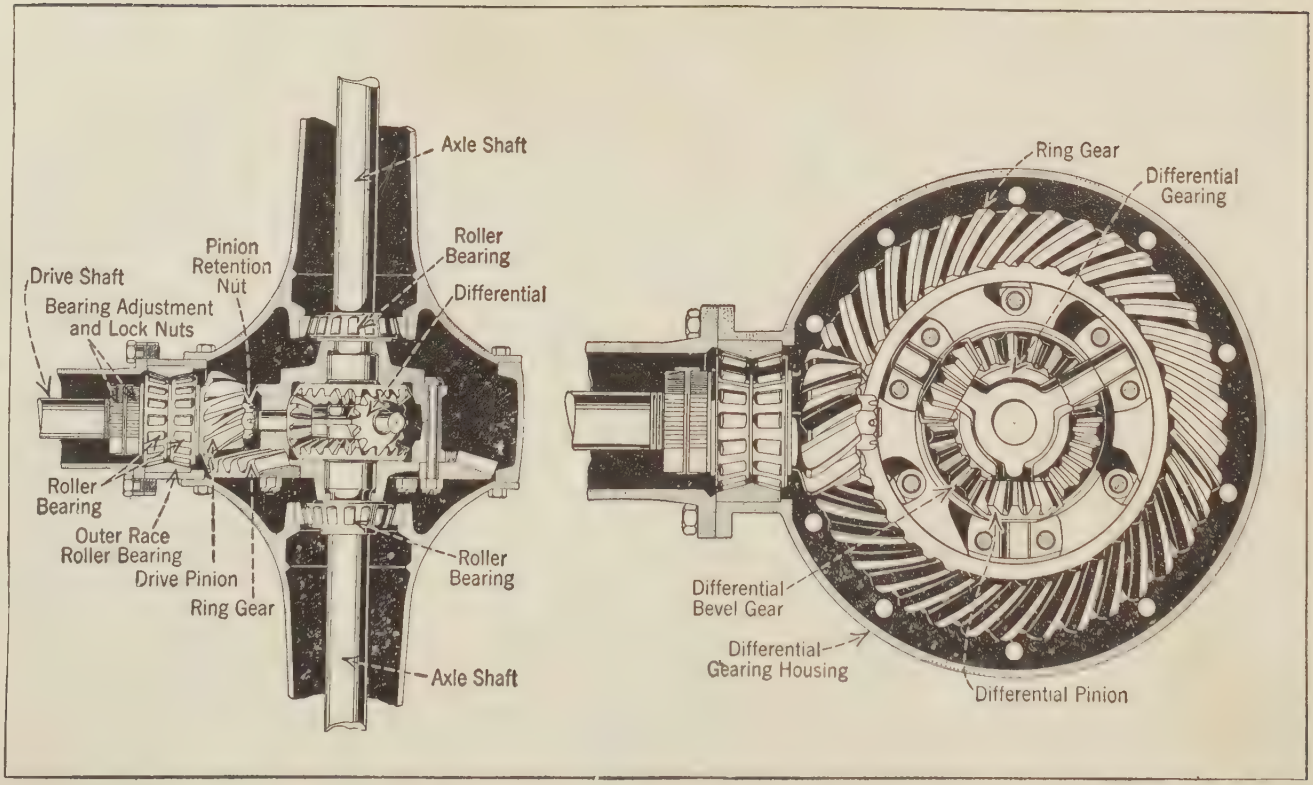


Fig. 12.—Sectional Views Outlining Construction of Bevel Driving and Differential Gearing of Ford Model A Rear Axle. Note Use of High Grade Taper Roller Bearings and Spiral Bevel Gears, Features Found in Higher Priced Cars. Plan Sectional View of Differential Housing Shown at Left, Side Sectional View at Right.

brakes. The total braking surface is 168 sq. in. In order to assure continued service and easy adjustment, all

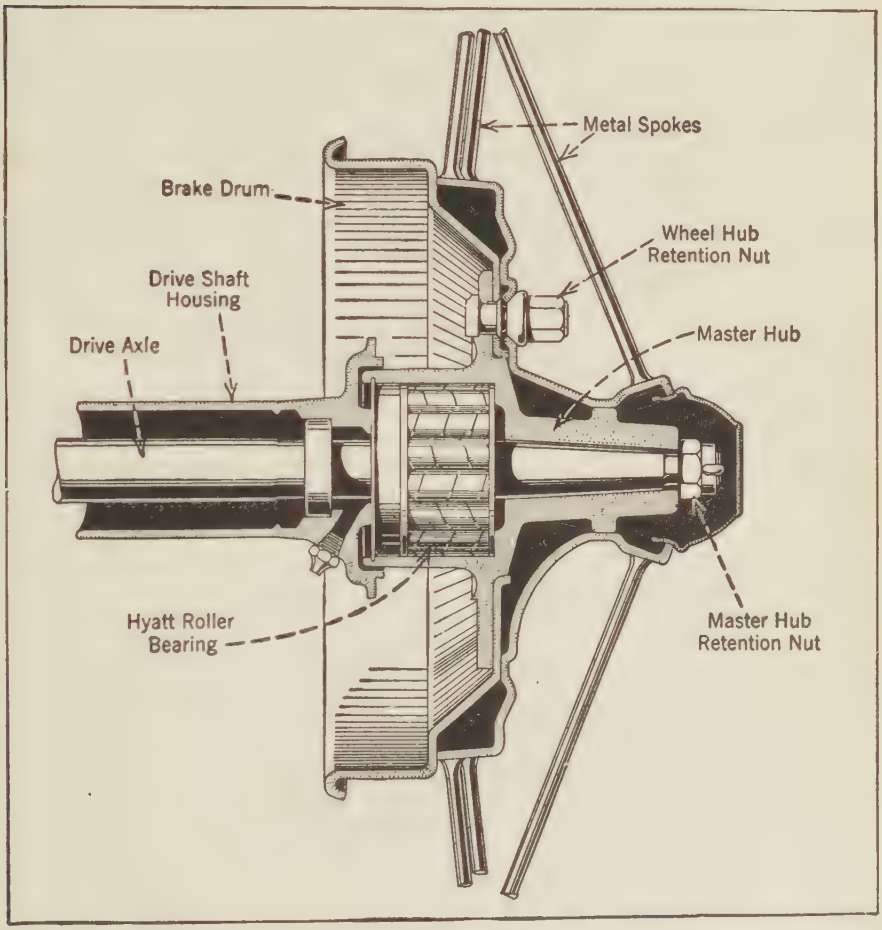


Fig. 13.—Sectional View of Ford Model A Rear Wheel Showing Large Hyatt Roller Bearing for Hub Support.

brake working parts are cadmium-plated, thus making them rust-proof. The brake actuating rods are clearly indicated in diagrams at Fig. 14, which shows the front

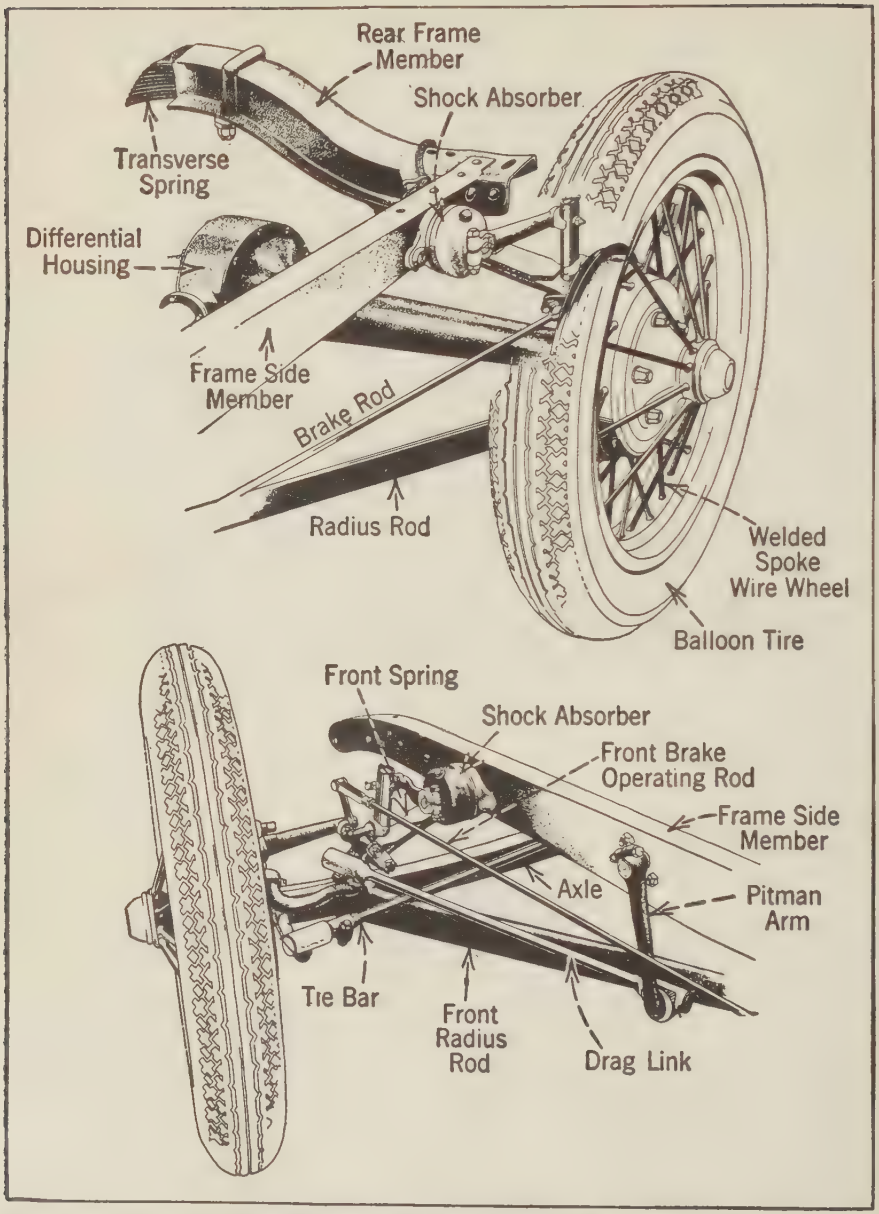


Fig. 14.—View of Rear Corner of Ford Model A Frame at Top Shows Transverse Rear Spring and Shock Absorber Installation. Front Corner of Ford Chassis Showing Steering Members and Front Wheel Brake Operating Rod. Note Hydraulic Shock Absorber.

and rear spring construction and the installation of the shock absorbers.

As formerly, the springs are of the transverse semi-elliptic type. They are built of fine spring steel and the leaves are unusually wide and very thin. Each spring is built up of varying sizes and numbers of leaves to give proper flexibility for the particular body style for which the chassis is designed. The action of the hydraulic shock absorbers is adjustable and controls both up and down motion, thus resulting not only in greater comfort to passengers, but also making the car safer. Torque tube drive, which takes up all strain of starting and stopping the car, leaves the rear springs free to perform their sole function—that of carrying the car and passengers. The lubrication of the chassis is by means of a grease gun and special fittings.

Two-shoe construction is used for the internal four-wheel brakes. These "Grey Rock" shoes carry the regulation riveted woven brake-lining. The brakes are rod-operated. The brakeshoes are spread apart by a wedge between rollers on the shoes, as shown in Fig. 15, the wedge push rod passing through the knuckle pin. At the top the shoes are connected by short levers to a bracket which has an adjustment outside of the brake, this adjustment spreading the tops of the shoes apart to take up wear. The brake operating pressure is equalized between front and rear. From the pedal a short rod runs back to a cross-shaft under the center cross-member, the pull being transmitted by means of bell cranks to two horizontal shafts below them. The outer ends of the latter shafts are not rigidly supported, but can move back and forth. Attached to these outer ends are double-

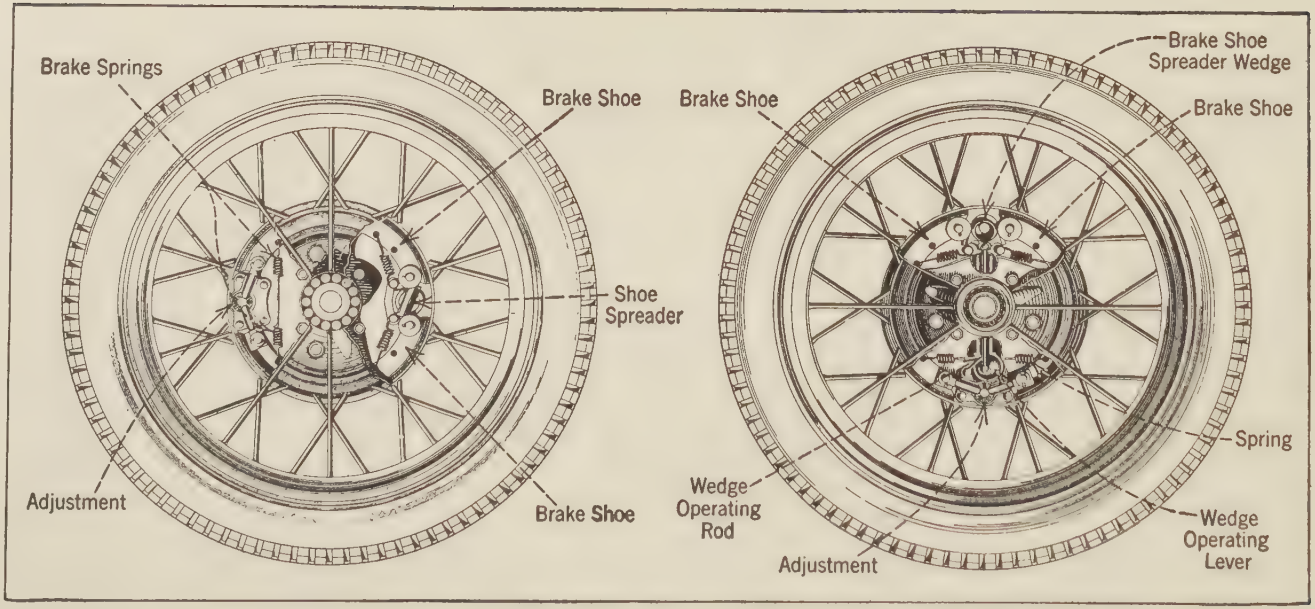


Fig. 15.—View of Rear Wheel of Ford Model A Car at Left Shows Expanding Two-Shoe Brake. The Illustration at the Right Shows the Method of Actuating Front Wheel Brake by a Rod Passing Through Steering Spindle Bolt.

armed levers, the upper arm actuating the rear wheel brake.

The car has a wheelbase of 103½ in. and a tread of 56 in. The rear axle reduction is 3.7 to 1. The minimum road clearance is 9½ in. The center section of the front axle is made of chromium steel. Brake diameters are 11 in. all around and the length of the lining is 14 in. per wheel, the width of the lining being 1½ in., and the thickness 3/16 in. The total braking area is 168 sq. in. The front spring is 1¾ in. wide; the rear, 2¼. All springs are made of chromium steel. The pressed steel frame is of 5/32 in. stock, and the section is 4 in. deep.

The Ford Model A Truck.—Truck models in the new Ford line are rated at 1½ tons with single rear wheels, and 2½ tons with dual rear wheels. Four-wheel brakes, worm-drive rear axles, torque tube drive, cantilever rear springs, and welded steel-spoke wheels are used on both models, which are practically identical except for rear wheel equipment. The powerplant is the same as that embodied in the new passenger cars consisting of a four-cylinder 3⅞ by 4¼ in. engine with battery-distributor ignition and oil and water pumps, multiple-disk clutch and three-speed sliding gear transmission. An additional two-speed auxiliary transmission is offered at extra cost. Front axle, front wheel brakes and steering gear are substantially the same as the passenger car units.

An inclosed cab and express, stake and platform bodies are available. Cabs are all steel and are finished in imitation leather, and doors, which are equipped with crank window regulators, are similar to those used on the passenger cars. The gearshift lever is in the center and the hand brake lever on the left. The light control switch is placed above the steering wheel and the spark

and throttle levers are below it, but quadrants are not provided. A carburetor control rod is beneath and forward of the cowl on the right, and the gasoline shut-off valve may be reached from the driving compartment. The express body is all steel except the floor and sills, which are of seasoned wood. This body is 7 ft. 2 in. long and 4 ft. wide, while the stake body measures 8 ft. 1½ in. inside length and 5 ft. 8 in. width, the racks extending 26 in. above the floor.

Distance from the back of the cab to the rear of the frame is approximately 81¼ in., and from back of cab to center of rear axle about 52 in. The height of the frame is approximately 31 in. at the rear and 27½ in. at the rear of the cab. The frame tapers outward from the rear, being about 33½ in. wide at the cab and 40½ in. at the rear end. The rear axle is of the three-quarter floating type, with rear wheel loads taken by roller bearings on the outside of the housing. The assembly embodies two axle housing halves bolted together and an overmounted worm with double external adjustments. Standard gear ratio is 5 to 1. Two radius rods are employed on the torque tube and the axle end of each rod is used to support the inner end of the brake shaft. Two rear wheel brake drums, which are 14 in. in diameter, inclose internal brakes of the rigid-shoe type. Two shoes are used in each brake, and they are divided on a horizontal line with the operating cam at the front and the adjustable anchorage at the rear.

The frame has an overall length of 171⅝ in., and the depth is 6 in. with flange width of 2¾ in. The bottom of the side rail tapers upward from the trunnion mountings for the rear springs to the rear end. Five heavy channel cross-members are used, the rear member being

offset downward and fitted with a bracket for carrying the spare wheel, or wheels, below the body. The next member forward is of U-section with wide flanges, and is arched to provide clearance for the axle housing. Third carries the forward end of the torque tube and the next carries the front propeller shaft, or the bearing between the two transmissions if the dual unit is used. The front cross-member mounts the engine front support, the radiator and the transverse front spring. In addition, the rear engine supports virtually form an additional cross-member.

Wheel base is 131½ in., compared with 124 in. on the former truck. The rear axle is similar to the unit formerly used, and the necessary extension of the power line is accomplished by use of an inclosed intermediate propeller shaft. At the rear of the transmission a tube with a ball end similar to that on the front of the torque tube is mounted within the ball cap, and this tube and the propeller shaft extend to a frame cross-member where the universal joint, ball and cap assembly are duplicated. The auxiliary transmission, when supplied, is placed back of the regular unit and in place of the front part of the intermediate propeller shaft.

The 17-leaf rear springs are located outside the frame rails and are shackled to the frame at the front end and pass below the trunnion mounting on the side of the frame. Connection with the rear axle housing is made by a split member which encircles the housing. The main leaf of the spring is practically level and has little if any camber.

Auxiliary Two-Speed Transmission.—The dual transmission is of the planetary constant-mesh type and provides a reduction of 1.47 to 1. It has three planet pinions

which turn around a sun gear and mesh with the large internal gear; being similar in this respect to the Model T steering gear. This auxiliary transmission is controlled by means of a separate internal-and-external gear clutch provided for this purpose ahead of the planetary gear-

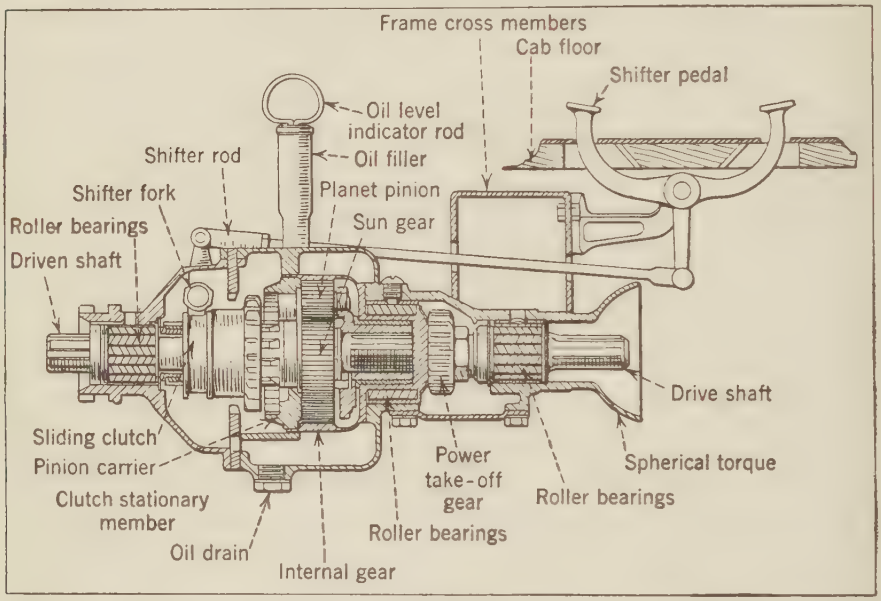


Fig. 16.—Longitudinal Section of the Auxiliary Two Speed Transmission for Ford Model A Truck Showing Planetary Gears and Positive Clutches.

ing. In direct drive, of course, there is no relative motion of the working gears, since the sliding member of the clutch mentioned locks the planetary system, which latter is mounted on roller bearings as shown by the accompanying illustration, Fig. 16.

For low speed, the clutch member locks the sun gear of the planetary system so it cannot revolve. The drive is then taken from the engine through the large internal

gear of the planetary system, forcing the three planet pinions to revolve around the sun gear. Since the sun gear is stationary, the planets do not rotate around the axis of the transmission as rapidly as the internal gear, thereby providing a reduction which in this transmission is about 32 per cent. The cage which supports the three

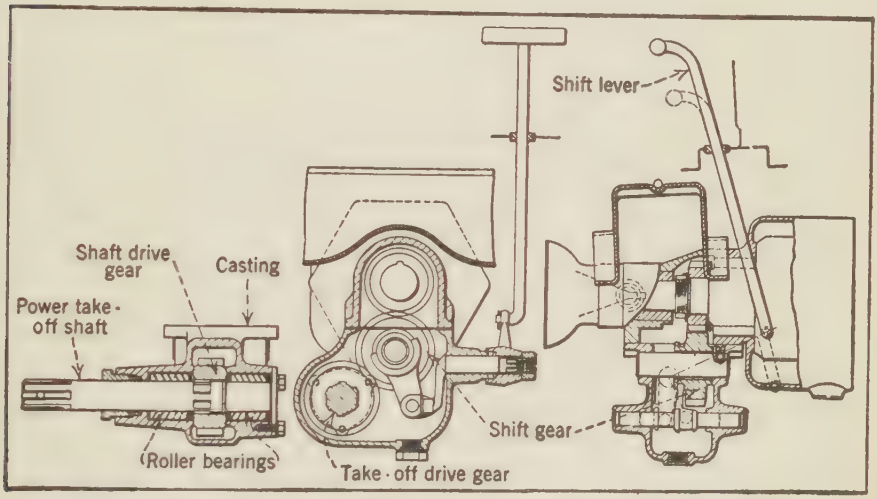


Fig. 17.—Suggestion for Power Take-Off Arrangement to Use in Connection with Ford Auxiliary Transmission.

pinions is connected to the driven shaft, which transmits the torque to the rear axle.

The auxiliary transmission is foot-controlled. There are two pedals projecting through the cab floor. By depressing one pedal, the auxiliary transmission is locked and therefore disengaged, while by depressing the other pedal, it is engaged. It is claimed that the pulling capacity of the truck is increased 47 per cent by the use of this transmission. In direct drive, speed and pull are the same as with the standard truck without the auxiliary transmission.

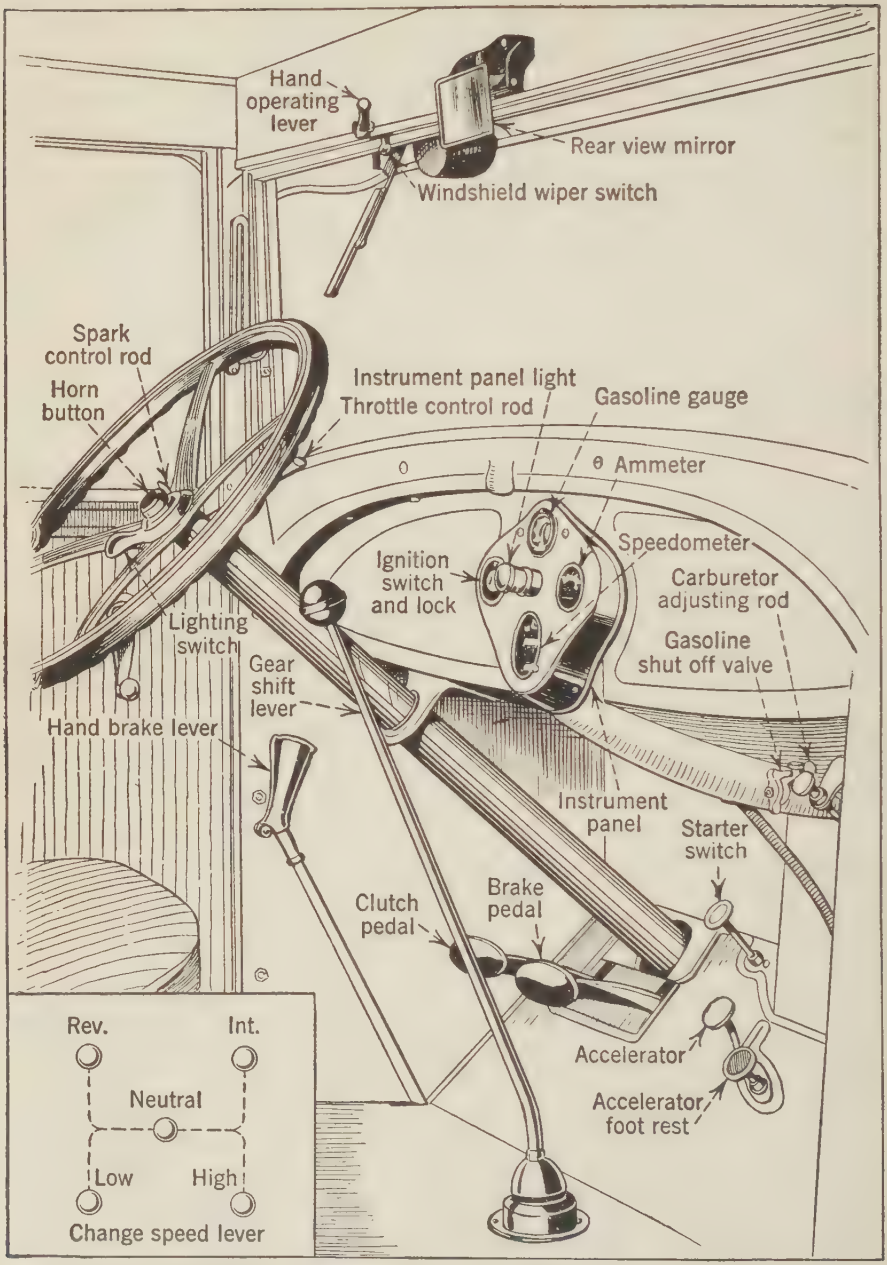


Fig. 18.—Instruments and Control Levers of Ford Model A Cars Follow Conventional Practice. Inset Shows Standard Gear Shift Lever Positions.

This transmission is provided for the new Ford truck as optional equipment at extra cost. It is also provided with a power take-off gear for use with dump bodies, etc. The power take-off itself is not supplied by the Ford Motor Co., which furnishes the suggested design reproduced herewith at Fig. 17.

OPERATING FORD MODEL A CAR

Filling the Radiator.—Before starting the car, see that the radiator is filled with clean fresh water. The cooling system holds approximately three gallons. If in winter, use anti-freeze solution (procurable from any Ford dealer). As the proper cooling of the engine is dependent upon the water supply, it is important particularly with a new car to see that the radiator is kept well filled. Any steaming causes loss of water as will leaks in hose or radiator.

Filling the Gasoline Tank. —The tank has a capacity of ten gallons. The gasoline gauge on the instrument board panel indicates the amount of gasoline in the tank. Gasoline can be drained from the tank by opening the petcock in the sediment bulb located on the engine side of the dash. The screen in the gasoline tank filler neck should occasionally be removed and cleaned. IMPORTANT—After cleaning be sure to replace this screen. Also see that the small vent hole in the gasoline tank cap does not become clogged. If the vent hole is clogged the gasoline will become air bound and fuel supply will be irregular.

Proper Oil Level. — Before starting the engine, make sure there is a sufficient supply of medium light, high grade engine oil in the oil pan. If there is not enough oil, more should be added through the breather pipe lo-

cated at the left side of the engine (a metal cap covers it). Five quarts of oil is the amount required in the oil pan. To determine the correct oil level, use the indicator, which is of the bayonet type, located on the left side of the engine just to the rear of the breather pipe as follows: Pull out the indicator—wipe it off—re-insert the indicator and again remove it. The mark made by the oil indicates its level. When the oil reaches the point marked "F" on the indicator, it is at the proper level. Under no circumstances should the oil be permitted to get below the point marked "L" as any attempt to run the engine with too little oil may seriously damage the parts. The letter "F" indicates "full," the letter "L" means "low." When replacing the oil level indicator, see that both the short and long ends of the indicator enter the opening in the crankcase. Failure to insert both ends into the opening permits the oil to leak out as the opening is not fully closed.

Before Starting the Engine. — Be sure the gear shift lever is in neutral position—i.e., the position in which it can be moved freely from side to side, as in any standard gear shift car.

Advance the throttle lever, located under the steering wheel (right hand side), about three notches, or until the accelerator pedal moves slightly downward. The Ford Model A control levers and instruments are shown at Fig. 18.

Pulling down the throttle lever or pressing on the accelerator pedal, controls the quantity of gas entering the cylinders, and regulates the speed of the engine. In the Model T there was no accelerator pedal. Carburetor control was entirely by hand lever.

Place the spark lever (left hand) at the top of the

quadrant (the notched quarter-circle on which the lever is operated). This is the retard position. The spark lever regulates the timing of the spark which explodes the gas in the cylinders. Readers who are familiar with the Model T will note the changed location of engine controls.

Always retard the spark lever when starting your car. Starting the engine with the spark advanced may cause the engine to kick back, and damage the starter parts. After the engine is started, advance the spark lever all the way down the quadrant.

Theft-Proof Lock.—The Ford type electro-lock used in the ignition switch is a combination switch and theft-proof lock affording full protection for the car and meeting the exacting requirements of the underwriters as regards theft insurance. To unlock the electro-lock, simply insert the switch key into the ignition switch and turn the key to the right. This releases the cylinder of the lock, which snaps forward and closes the ignition circuit. When the cylinder is released the engine can be started in the usual manner, AND THE SWITCH KEY WITHDRAWN FROM THE LOCK.

To shut off the engine, push in on the cylinder of the lock until it snaps back in the lock position. This shuts off the ignition and locks the car in a positive manner.

Starting the Engine.—1. Release the lock cylinder by turning the switch key to the right. 2. See that the spark lever is retarded; the throttle lever advanced three or four notches on the quadrant, and the gear shift lever in neutral position. 3. If the engine is cold, turn the carburetor adjusting rod one full turn to the left, to give it a richer mixture for starting. This rod serves both as a choke for starting and as an enriching adjustment.

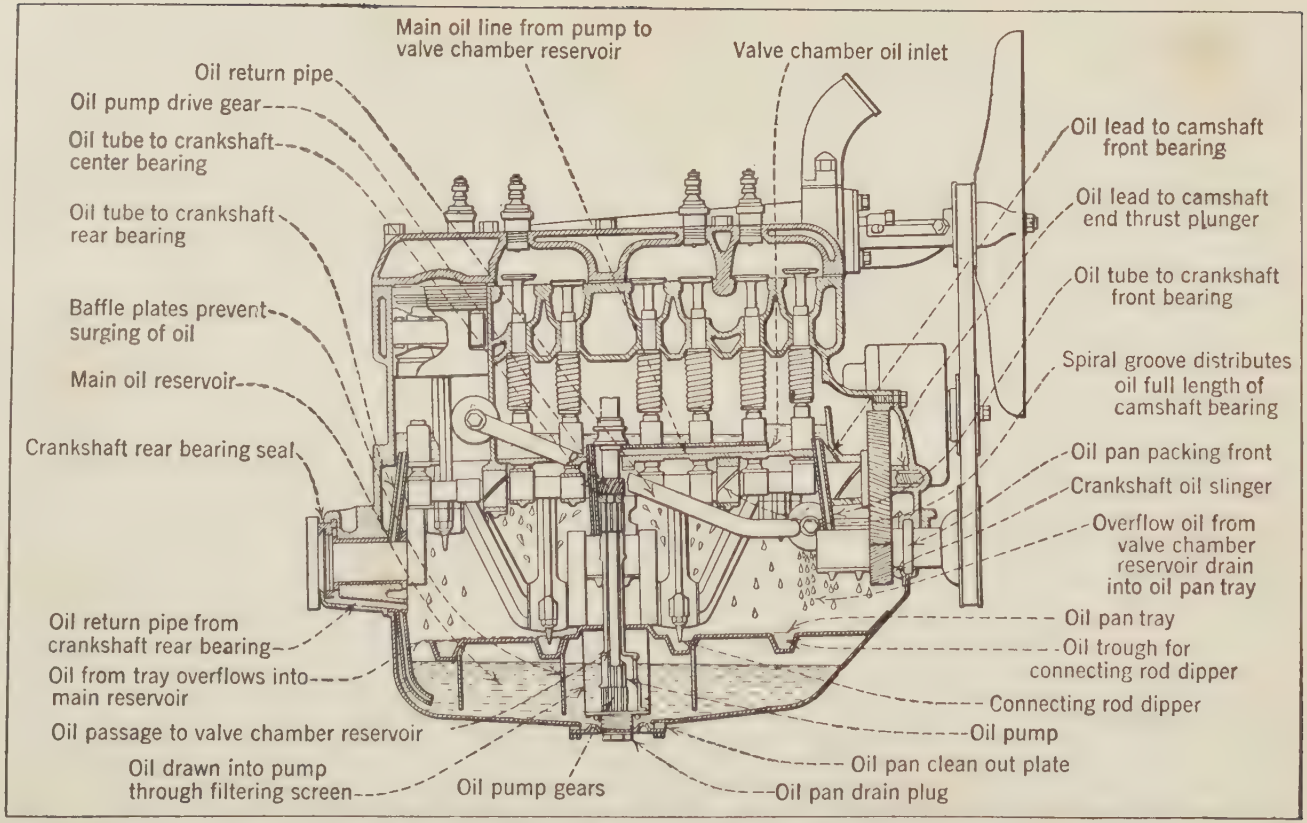

Main oil line from pump to valve chamber reservoir
Valve chamber oil inlet
Oil return pipe
Oil pump drive gear
Oil tube to crankshaft center bearing
Oil tube to crankshaft rear bearing
Baffle plates prevent surging of oil
Main oil reservoir
Crankshaft rear bearing seal
Oil lead to camshaft front bearing
Oil lead to camshaft end thrust plunger
Oil tube to crankshaft front bearing
Spiral groove distributes oil full length of camshaft bearing
Oil pan packing front
Crankshaft oil slinger
Overflow oil from valve chamber reservoir drain into oil pan tray
Oil pan tray
Oil trough for connecting rod dipper
Connecting rod dipper
Oil pump
Oil pan clean out plate
Oil pan drain plug
Oil return pipe from crankshaft rear bearing
Oil from tray overflows into main reservoir
Oil passage to valve chamber reservoir
Oil drawn into pump through filtering screen
Oil pump gears

Fig. 19.—Sectional View of Ford Model A Engine Showing Method of Lubricating Internal Mechanism by Combined Pump and Splash System.

Next pull back the rod, at the same time pressing down on the starter button and release the choke rod; next advance the spark lever. When the engine warms up, turn the choke rod back to its normal position one-quarter turn open.

When starting a warm engine, do not pull back the choke rod unless the engine fails to start on the normal mixture, as there is a possibility of flooding the engine with an over-rich mixture of gas. If you should by accident flood the engine, open the throttle and, with the choke rod in normal position, turn the engine over a few times to exhaust the rich gas. If you continue to turn the engine with the choke rod out the flooding will become greater and engine increasingly difficult to start.

Starting the Car.—Release the hand brake lever. With the engine running, disengage the clutch by pushing down the left foot pedal. Move the gear shift lever to the left and back, which is the low speed position as shown in insert in Fig. 18. Gradually release pressure on the clutch pedal, allowing it to return to its normal position, and at the same time increase the speed of the engine by pressing lightly on the accelerator. Second Speed: When the car has reached a speed of five to eight miles per hour, engage second or intermediate speed as follows: Release pressure on accelerator and again disengage the clutch, moving the gear shift lever through neutral to the right and forward, second speed position. Allow the clutch pedal gradually to return to its normal position, and increase the speed of the car until it is running 12 to 15 miles per hour. High Speed: Disengage the clutch as before; at the same time release the pressure on the accelerator and pull the gear shift lever straight back from second speed. Then engage the clutch and increase

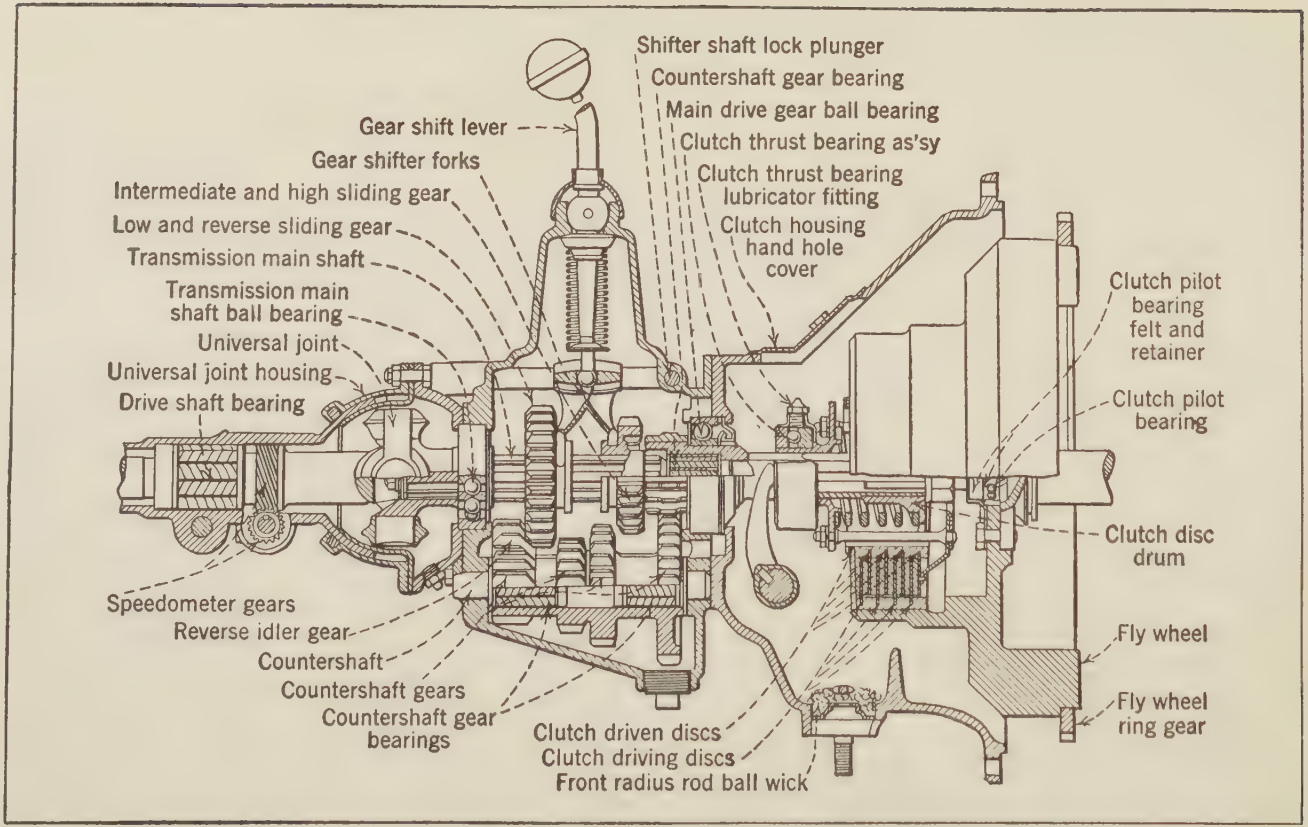


Fig. 20.—Sectional View of Clutch and Gearset Assembly of Ford Model A Showing Clutch and Change Speed Gear Relation.

the speed of the engine, as driving conditions may require.

Shifting Back Into Low Speed.—When shifting from high to second speed, at car speeds not exceeding 15 miles per hour, there should be no hesitation in neutral. The lever should be moved as quickly as possible, from high to second speed. Should it be necessary to shift from high to second speed at higher car speeds, it can be done by the following method: Disengage the clutch and shift into neutral. Reengage the clutch and at the same time accelerate the engine; then disengage the clutch again and shift to second, after which disengage the clutch. With a little experience, this shift can be made quietly.

Descending a Hill. — When descending long, steep grades, have the transmission in gear, the clutch engaged, and the ignition switch on. This allows the engine to turn over against compression and act as a brake. On very steep grades the car should be in second speed gear before descent is started. On exceptionally steep grades the low speed should be used. This increases the braking action of the engine. Always leave the ignition switch on when descending an incline. Shutting off the switch allows raw gas to be drawn into the cylinders, which washes the lubrication off the cylinder walls. Also unexploded gas collects in the muffler, and when the switch is again turned on there is a possibility of blowing out the muffler, which has become filled with highly explosive mixture.

To Stop the Car.—Disengage the clutch by pressing forward on the left pedal and apply the foot brake by pressing forward on the right pedal. Except when a quick stop is necessary, it is advisable to apply the brake

gradually. When driving on wet or slippery pavement the speed of the car should be reduced by applying the foot brake before releasing the clutch. This method of braking prolongs the life of the brake lining, and is a safety factor.

In bringing the car to a final stop, keep the clutch disengaged until the gear shift lever has been moved into neutral position. To stop the engine, push in on the electro-lock cylinder until it snaps back into the lock position. The driver should endeavor to so familiarize himself with the operation of the car that to disengage the clutch and apply the brakes becomes automatic—the natural thing to do in case of emergency.

To Reverse the Car.—The car must be brought to a stop before attempting to reverse its direction. To shift into reverse, proceed as in shifting into low speed, except that the gear shift lever is moved to the left and forward.

The Spark Control.—For normal driving, drive with the spark lever fully advanced. When the engine is under a heavy load, as in climbing steep hills, driving through heavy sand, etc., the spark lever should be retarded sufficiently to prevent a spark knock. This is a pronounced knock, which is sometimes mistaken for a worn bearing.

Driving the Car.—The different speeds as required to meet road conditions are obtained by varying the pressure on the accelerator, which in turn controls the motor. Practically all the running speeds needed for ordinary travel are obtained in high gear; the low and second speed gears are used principally to give the car momentum in starting, and when the engine is subjected to a heavy load.

Caring For the New Car.—A new machine requires

more careful attention during the first few days it is being driven than after the parts have been thoroughly "worked in." To obtain the best results, a new car should not be driven faster than 30 to 35 miles per hour for the first 500 miles. The oil in the engine should be changed after this distance has been covered, as there may be a few metallic particles or sand in a new engine. Never start out with your car until you are sure it has plenty of oil, water and gasoline.

See that an air pressure of 35 pounds is maintained in all tires. Under inflation causes more tire expense than anything else.

Inspect your battery every two weeks and keep it filled to the proper level with distilled water. If the water is allowed to evaporate below the top of the plates the life of the battery will be seriously affected.

Let the Ford dealer or expert Ford repairman go over your car once a month, making any mechanical adjustments necessary to keep your car in proper running order.

Do Not Rest Foot on Clutch Pedal. — Do not make a practice of resting your foot on the clutch pedal while driving, as this may cause the clutch to slip and unnecessarily wear the facing on the discs. This is called "riding the clutch" and causes premature clutch trouble in any make of car. The correct clearance or play for the clutch pedal is approximately ¾ in. That is when the clutch pedal is depressed there should be about ¾ in. play in the pedal before it starts to disengage the clutch. As the clutch facings wear this clearance or play gradually grows less. Consequently it should occasionally be checked. Under no circumstances should the car be driven without clearance or play in the clutch pedal.

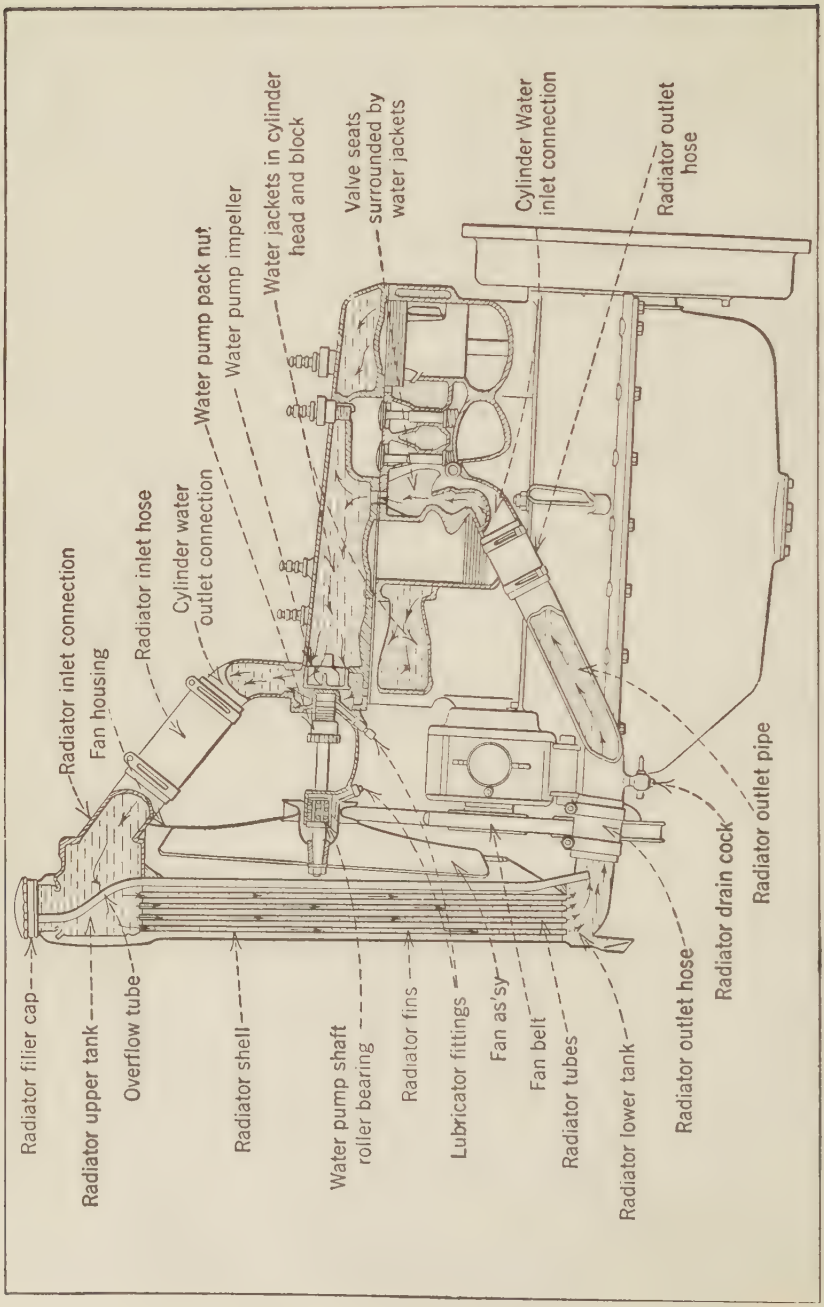


Fig. 21.—The Ford Model A Engine Water-Cooling System Illustrated in Detail.

Cooling Fan Belt Adjustment

The adjustment is easily made by removing a steel clevis pin and turning the release arm rod after it is lifted

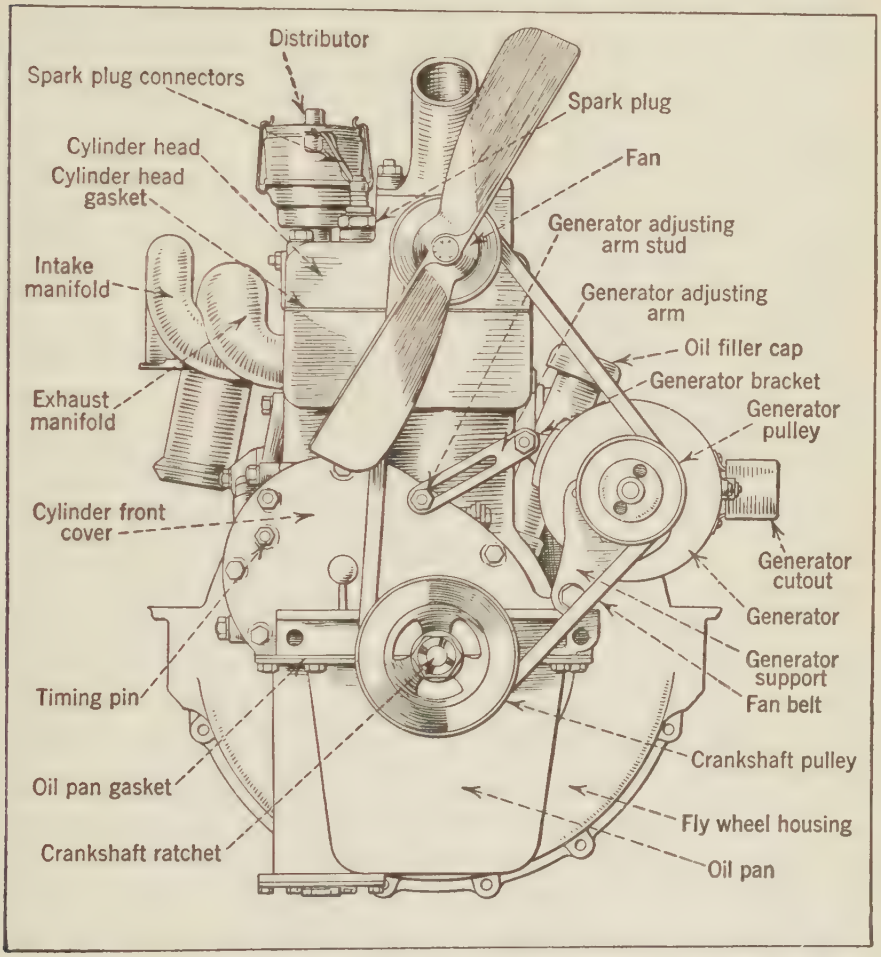


Fig. 22.—Front View of Ford Model A Engine Showing Cooling Fan and Generator Drive by V Belt, Also Method of Adjusting Belt Tension.

from the actuating lever. Screwing the rod in augments the clutch pedal play. Screwing the rod out reduces the play. After making adjustment, be sure to replace steel pin and cotter key.

The Ford Lubricating System.—The purpose of lubricating is to reduce friction between moving surfaces. The oiling chart gives full information for lubricating the Ford car and can be obtained from any agent. Proper lubricating has a vital effect on the life of your car; consequently, you should follow the instructions of the manufacturer very carefully.

All parts of the engine are lubricated from the oil reservoir in the oil pan by the Ford Pump, Splash and Gravity Feed. Only medium light, high grade engine oil should be used in the engine.

Oil of the proper kind reaches the bearing surfaces with greater ease and cuts down friction and reduces heating. It should, of course, have sufficient body so that the pressure between the two bearing surfaces will not force out the oil and allow the metal to come in actual contact. Too light in body is as undesirable as too heavy body in oil. Heavy and inferior oils have a tendency to carbonize quickly, also "gum up" the piston rings, valve stems and bearings. In cold weather a light grade of oil having a low cold test is absolutely essential for the proper lubrication of the car. Such oils can be secured from any Ford service station or reliable supply house.

Oil conforming to the following specifications is recommended for use in the Model "A" engine. The engine lubricating system is shown at Figure 19.

Draining the Oil Pan.—It is advisable to clean out the oil pan by draining off the dirty oil when the new car has been driven 500 miles, and thereafter to repeat this operation every 500 miles. The oil should be warm before draining. It is a good plan, especially in cold weather, to remove and clean the oil pan clean-out plate once a month.

WINTER OIL

COLOR	FLASH	FIRE	VISCOSITY		COLD SET	GRAVITY
Not darker than	(Open Cup) °F.	°F.	Saybolt-Universal 100 °F.	210 °F.	°F.	Beaume
No. 5	390 Min.	450 Min.	450 Sec. Max.	58 Sec. Max.	20 Max.	22 Min.

SUMMER OIL

COLOR	FLASH	FIRE	VISCOSITY		COLOR SET
Not darker than	(Open Cup) °F.	°F.	Saybolt-Universal 100 °F.	210 °F.	°F.
No. 6	400 Min.	450 Min.	650 Max.	66 Max.	45 Max.

Lubricating the Differential.—Every 5,000 miles the lubricant in the differential should be drained and the housing flushed with kerosene. New lubricant should then be added until it reaches the level of the oil hole in the housing

Lubricating the Transmission.—About once every 5,000 miles the gear lubricant should be drained from the transmission by removing the drain plug at bottom of transmission case. The interior of the transmission case should be then thoroughly flushed with kerosene and refilled with fresh gear lubricant. The new lubricant is poured into the transmission through the filler hole, located at the right hand side of the transmission case. Pour sufficient lubricant in until it reaches the level of the filler hole.

Lubrication of the Clutch Bearing. — The clutch pilot bearing at the front end of the clutch is thoroughly packed with grease when the car is assembled, and it will not be necessary to lubricate this bearing until such time as the clutch may be disassembled. When the

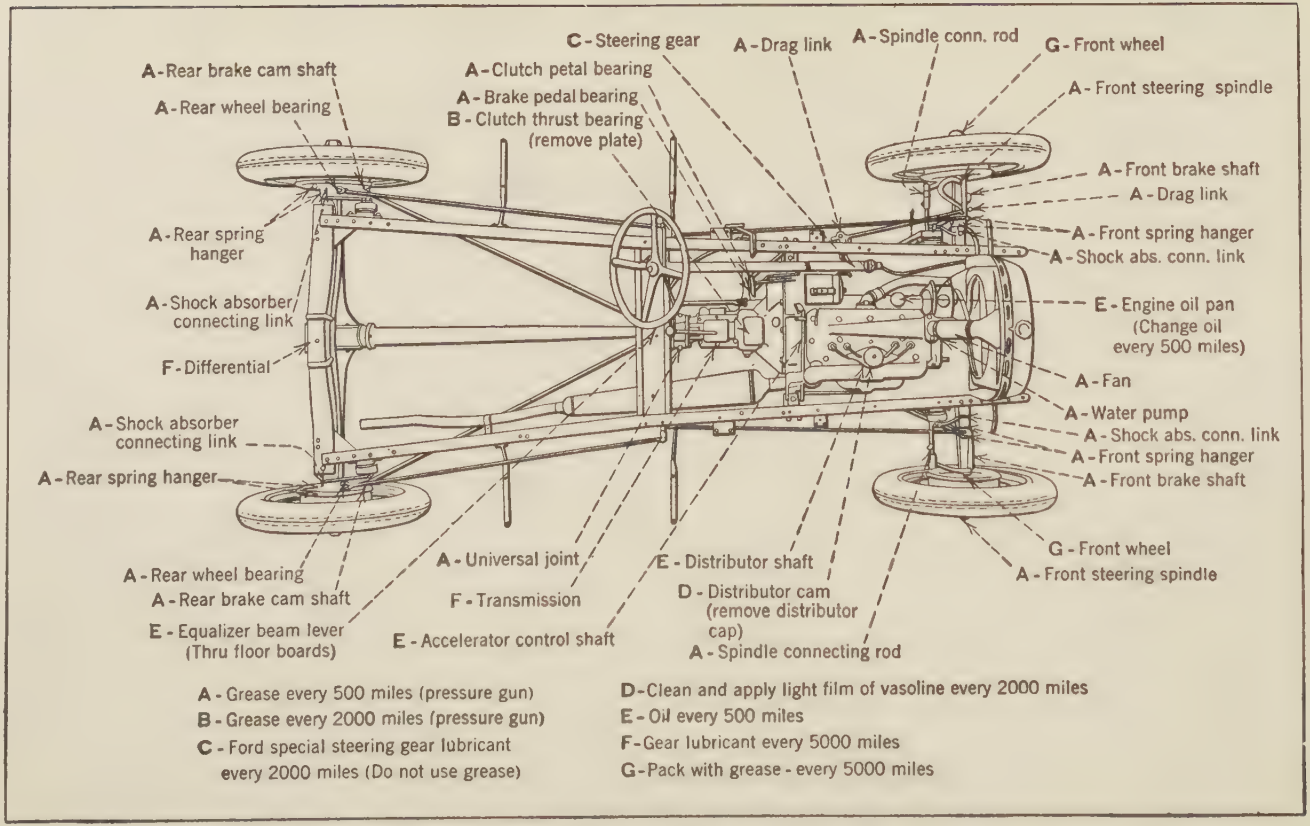

A - Rear brake cam shaft
A - Rear wheel bearing
A - Rear spring hanger
A - Shock absorber connecting link
F - Differential
A - Shock absorber connecting link
A - Rear spring hanger
A - Rear wheel bearing
A - Rear brake cam shaft
E - Equalizer beam lever (Thru floor boards)
C - Steering gear
A - Clutch petal bearing
A - Brake pedal bearing
B - Clutch thrust bearing (remove plate)
A - Universal joint
F - Transmission
E - Accelerator control shaft
A - Drag link
A - Spindle conn. rod
E - Distributor shaft
D - Distributor cam (remove distributor cap)
A - Spindle connecting rod
G - Front wheel
A - Front steering spindle
A - Front brake shaft
A - Drag link
A - Front spring hanger
A - Shock abs. conn. link
E - Engine oil pan (Change oil every 500 miles)
A - Fan
A - Water pump
A - Shock abs. conn. link
A - Front spring hanger
A - Front brake shaft
G - Front wheel
A - Front steering spindle
A - Grease every 500 miles (pressure gun)
B - Grease every 2000 miles (pressure gun)
C - Ford special steering gear lubricant every 2000 miles (Do not use grease)
D - Clean and apply light film of vasoline every 2000 miles
E - Oil every 500 miles
F - Gear lubricant every 5000 miles
G - Pack with grease - every 5000 miles

Fig. 23.—Diagram of Ford Model A Chassis Showing Parts That Need Periodical Lubrication.

clutch is disassembled the bearing should be repacked with a good grade of cup grease.

Approximately every 2,000 miles, lubricate the clutch release bearing. This is done by removing the hand hole cover (see Fig. 20) and turning the bearing until the lubricator fitting is at the top. Lubricate the bearing by means of the compressor grease gun.

IMPORTANT NOTE.—The clutch is a dry disc clutch and under no circumstances should it be oiled.

Greasing the Car.—In order to properly force lubricant to all parts equipped with the conical-shaped fittings, a high pressure lubricating system is employed. With this system the lubricant can be forced in under a pressure of 2,000 pounds or more per square inch, thus assuring a more thorough and positive lubrication than can be accomplished any other way. A compressor is supplied with the tool equipment of each car, and by means of this device lubricant can be forced into all bearings provided with conical-shaped fittings.

Remove top cap and plunger assembly to fill the compressor. Fill the barrel with lubricant. Pack the lubricant solidly. To avoid air pockets, tap the nozzle gently on a board or work bench while filling. To prevent lubrication backing up and soiling hands, FILL UP ONLY TO THE TOP OF THE LETTERING ON THE OUTSIDE OF THE BARREL.

When the compressor is pressed against the conical-shaped fittings, the plunger moves forward, forcing the lubricant in the nozzle directly through the fitting into the bearing, under an extremely high pressure. When the pressure on the handle is released, grasp the barrel of the compressor with one hand and draw back the handle with the other, so as to load the compressor and

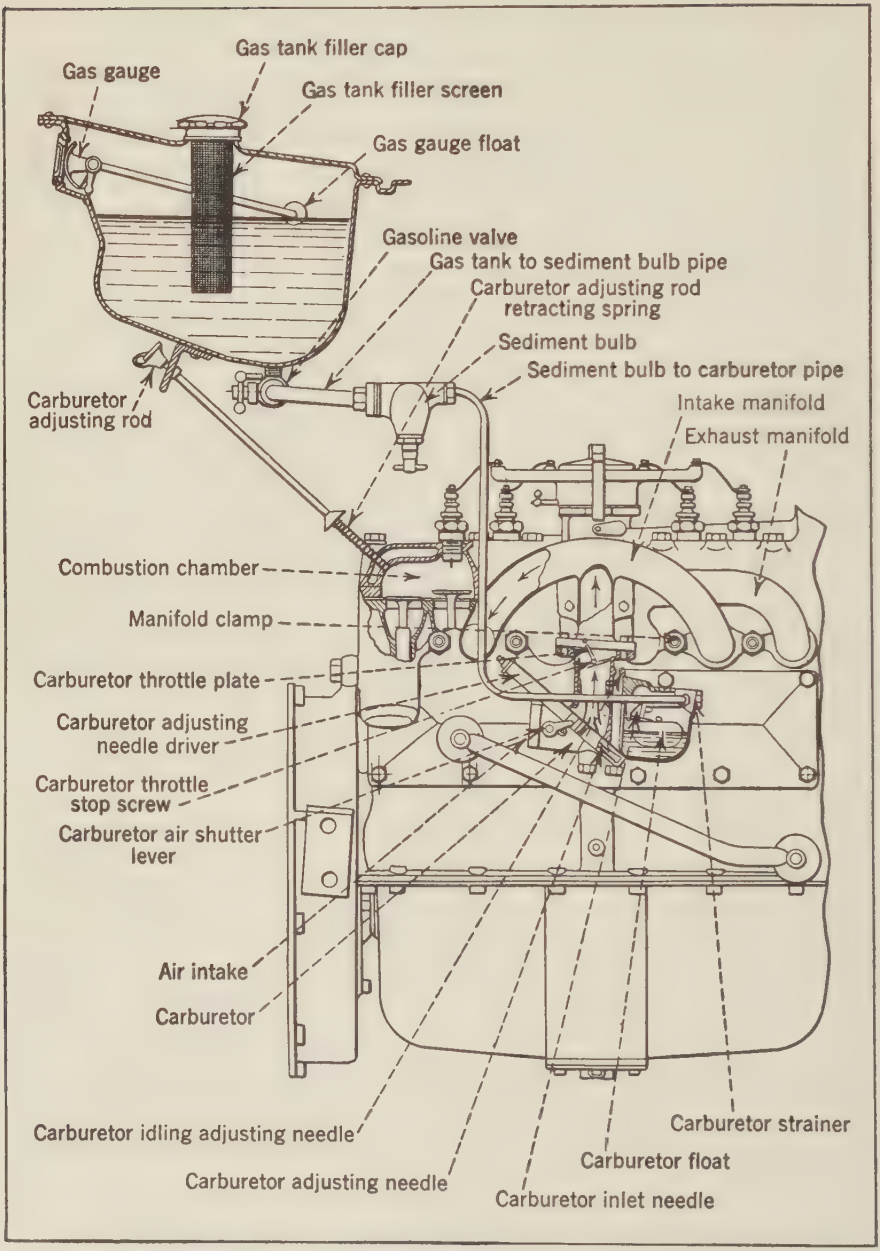


Fig. 24—The Ford Model A Engine in Part Section Showing Units That are Part of the Fuel Supply and Carburetor System.

make it ready to deliver a charge of lubricant with the next forward thrust.

The bearings in the generator and starting motor are lubricated when they are installed in the car, and require no further attention. The distributor should be kept clean and well oiled. Put oil in the oil cup at the side of the distributor every 500 miles. Add sufficient oil to reach the level of the oil cup. Every 2,000 miles remove the distributor cap, clean the lobes of the cam and apply a light film of vaseline.

Cooling the Engine.—The Ford engine is cooled by a circulation of water through the cylinder water jackets which surround the combustion chamber and valve seats. The water is circulated by thermo-syphon action, the flow of water being accelerated by means of a centrifugal water pump located in the front of the cylinder head. This pump draws the heated water from the engine into the upper radiator tank, where it is cooled by filtering through the radiator tubes to the lower tank. The radiator is cooled by means of the fan located just back of the radiator, where it draws a current of air around the radiator tubes. To prevent overheating, keep the radiator well filled. The capacity of the radiator is three gallons and the cooling system parts are clearly shown in illustration at Fig. 21.

Adjusting the Fan Belt.—The fan and water pump both operate from the same shaft. The shaft is driven by a "V" shaped rubber belt, as shown in front view of engine at Fig. 22. The belt is adjusted to the proper tension when the car leaves the factory, and this adjustment should not be changed unless the belt slips. The adjustment is easily made by loosening the generator adjusting arm stud nut, and moving the generator out-

ward. Do not tighten the belt more than is actually necessary to keep it from slipping, as too much pressure from excessive tension will cause undue loading on the pump shaft.

Packing is used in forming a water-tight connection around the water pump shaft. Should the packing become loose, tighten the packing nut. A screw driver is used for this purpose, using it as a pry and resting the blade on the supporting casting. Do not tighten the nut more than is necessary to stop the leak. The point of the screw driver is inserted in one of the slots of the stuffing box nut and rocked about the fulcrum point by bearing on the lever.

The entire circulating system should be thoroughly flushed out several times each season. To do this, open the petcock at the bottom of the radiator outlet connection pipe and insert a hose into the filler neck, allowing the water to flow through the system for about fifteen minutes, or until the water comes out clear.

Care of the Radiator in Winter.—In freezing weather it is necessary to use an anti-freeze solution in the circulating system to prevent freezing of the water and bursting the tubes in the radiator. This cooling solution should be put in with the first approach of cold weather.

Do not overlook the fact that constant evaporation will eventually weaken most anti-freeze solutions, consequently they should be tested frequently, especially in severe weather. It is better to have too rich a mixture of solution than to have too little compound. A suitable anti-freeze solution can be obtained from any authorized Ford dealer. Also complete directions as to the percentage of solution to be used to withstand the varying degrees of cold. As anti-freeze solutions usually contain

alcohol, care should be used when filling the radiator not to spill any of the solution, as it may damage the pyroxylin lacquer finish used on Ford cars. After filling the radiator, be sure the radiator cap is screwed down tight.

Fuel System.—The gasoline is carried in a ten-gallon tank welded integral with the cowl of the car. From this tank the gasoline flows by gravity to the carburetor. There it is mixed with air and drawn into the cylinders through the induction manifold and intake valves by piston suction. A sediment bulb located on the engine side of the dash is provided for draining off water or sediment that may have accumulated in the tank. Occasionally draining the bulb prevents foreign material being drawn into the carburetor.

The Carburetor.—The quantity of gasoline entering into the carburetor is governed by the needle valve. The volume of gas mixture entering the intake manifold is controlled by opening and closing the throttle, according to the engine speed desired by the driver. Since, with the exception of the needle valve and idle adjustment, all of the carburetor adjustments are fixed, about the only thing that could affect the carburetor would be dirt or water getting into it. An occasional cleaning will insure uninterrupted service. To clean the carburetor, remove the filter screen and thoroughly clean the screen by washing it in gasoline. The screen is easily removed by backing out the filter plug at the front of the float bowl. After cleaning, be sure to replace the screen. It is also a good plan to remove the brass plug at the bottom of the carburetor and drain the carburetor for a few seconds, to make sure any water left from condensation will escape.

For economical driving, careful mixture regulation

is important. Reduce the quantity of gasoline in the mixture by turning the adjusting rod to the right as far as possible without reducing the speed of the engine. This is particularly true when taking long drives, where conditions permit a fair rate of speed being maintained, and accounts for the excellent gasoline mileage obtained by good drivers. Turning the carburetor adjustment too far to the right results in a "lean" mixture—too far to the left results in a "rich" mixture. A lean mixture has too much air and not enough gasoline. A rich mixture has too much gasoline and not enough air. A rich mixture causes excessive carbon and overheating; likewise, it wastes fuel. The mixture should be kept as lean as possible without sacrificing the power of the engine. Too rich mixture causes black smoke and foul exhaust; too thin mixture causes popping back in carburetor.

The method of regulating the carburetor for ordinary driving conditions is to turn the carburetor adjusting rod to the right until the needle just seats, then turn the rod back one-fourth (¼) of a turn. Use care in adjusting the carburetor, as turning the needle down too tightly will result in its becoming grooved and the seat enlarged. When these parts are damaged, it is difficult to maintain proper adjustment of the carburetor until a new needle is used.

Fully retard the spark lever when setting idling adjustment. Set stop screw on throttle lever so that engine will run sufficiently fast to keep from stalling when it is idling. Turn the idling adjusting screw in or out until the engine hits evenly without "rolling" or "skipping" (the correct setting of the adjusting screw is approximately two turns off its seat). Next back off the stop screw until the desired engine speed is obtained. This

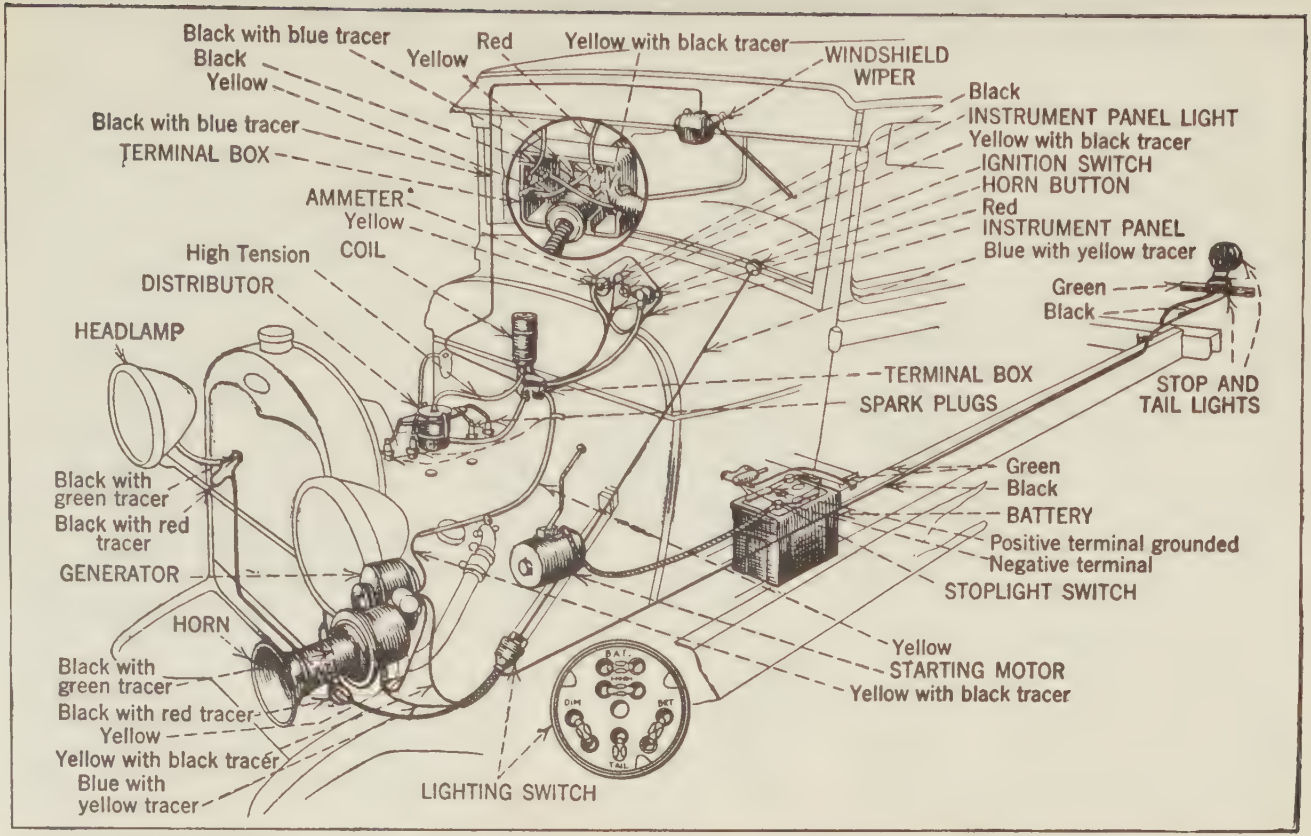


Fig. 25.—Diagram Showing All Electrical System Parts of the Ford Model A Car and Their Location Relative to Each Other.

adjustment should be made with the engine warm. Do not expect a new engine that is stiff to "rock" on compression when stopped, or to idle perfectly at low speed.

Electrical System.—The electrical system of the Ford Model A includes the following equipment, as shown at Fig. 25: Storage Battery, Generator, Starting Motor, Distributor, Ignition Coil, Spark Plugs, Ammeter, Horn, Lamps, Windshield Wiper (on closed cars).

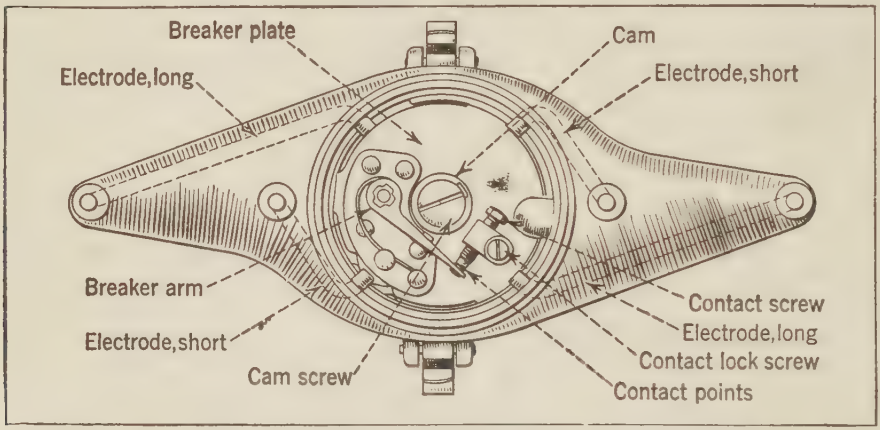


Fig. 26.—Top View of Ignition Current Distributor Showing Make and Break Points.

The current for igniting the gas mixture in the cylinders is provided by the storage battery. The ignition coil transforms the low tension current to a high tension current of sufficient voltage to jump between the points of the spark plugs. The distributor breaker points interrupt the flow of low tension current at regular intervals, while the distributor rotor distributes the high tension current to each spark plug in proper firing order. A complete wiring diagram is presented at Fig. 28.

Adjusting Breaker Contact Points.—The gap between

the breaker points is set at .015 to .018 in. The gap should occasionally be checked to see that the points are properly adjusted. The points are shown at Fig. 26.

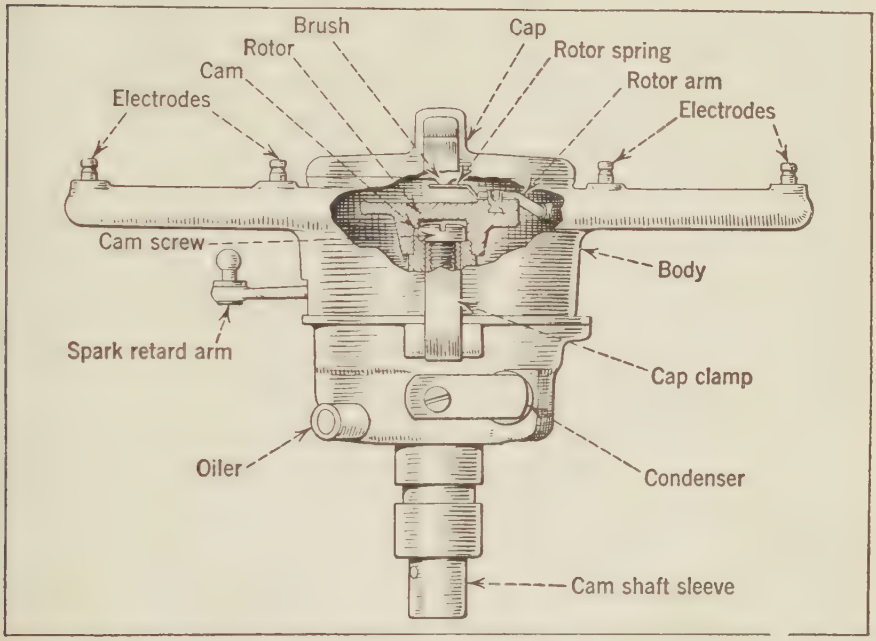


Fig. 27.—Side View of Ford Model A Ignition Distributor.

If the points are burnt or pitted, they should be dressed down with an oil stone. DO NOT USE A FILE.

To adjust the points, proceed as follows:

Lift distributor cap, rotor, and body.

Turn engine over slowly with starting crank until breaker arm rests on one of the four high points of the cam with the breaker points fully opened.

Loosen lock screw and turn the contact screw until the gap is at .015 to .018 in. A standard thickness gauge is used to obtain this measurement.

Ignition Timing.—As the spark must occur at the end of the compression stroke, the timing must be checked from that point. To find the compression stroke and time the spark, proceed as follows:

1. Fully retard spark lever.
2. Check gap between breaker contact points and, if necessary, adjust them as previously described.
3. Screw out timing pin located in timing gear cover and insert opposite end of pin into opening.
4. With the starting crank turn the engine over slowly, at the same time pressing in firmly on the timing pin. When the piston reaches the end of the compression stroke the timing pin will slip into a recess in the camshaft gear.
5. With the pin in place, remove the distributor cover and lift off rotor and distributor body.
6. Loosen cam-locking screw, shown at Fig. 27, until cam can be turned.
7. Replace rotor and turn it until the rotor arm is opposite No. 1 contact point in distributor head.
8. Withdraw rotor from cam and slightly turn the cam in a counter clockwise direction until the breaker points just start to open, then securely tighten cam-locking screw.
9. Replace rotor and distributor cover.
10. WITHDRAW TIMING PIN FROM RECESS IN TIME GEAR and screw it back tightly into the timing gear cover.

The Ford Starting System uses a six-volt, 80 ampere hour, 13-plate battery, designed and built in the Ford factory to meet the requirements of the Ford car.

Every two weeks check the electrolyte in the battery, to see that it is at the proper level. The solution (Electrolyte) should be maintained at a level with the bottom of the filling tube. If below this point, add distilled water until the electrolyte reaches the proper level. Water for battery use should be kept in clean, covered vessels of glass, china, rubber or lead. In cold weather add water only immediately before running the engine, so that the charging will mix the water and electrolyte and prevent freezing. Access to the battery is easily made by removing a small plate located in the floor board in front of the driver's seat. To remove the battery from the car it will be necessary to take out the floor boards. WHEN REPLACING THE BATTERY IN THE CAR BE SURE TO INSTALL IT WITH THE POSITIVE TERMINAL GROUNDED TO THE FRAME, AS SHOWN IN FIG. 25.

Keep the battery filling plugs and connections tight, and the top of the battery clean. Wiping the battery with a rag moistened with ammonia will counteract the effect of any of the solution which may be on the outside of the battery. A coating of vaseline will protect the terminals from corrosion. It is of vital importance that the battery is firmly secured in its supporting brackets at all times. If clamps are loose, the battery will shift about in the compartment and result in loose connections, broken cells, and other trouble. When repairs are necessary, or if the car is to be laid up for the winter, take the battery to a Ford dealer for proper attention and storage. Do not entrust your battery to inexperienced or unskilled hands.

The Generator.—The generator is of the Power House type, so called because of its similarity to the type of

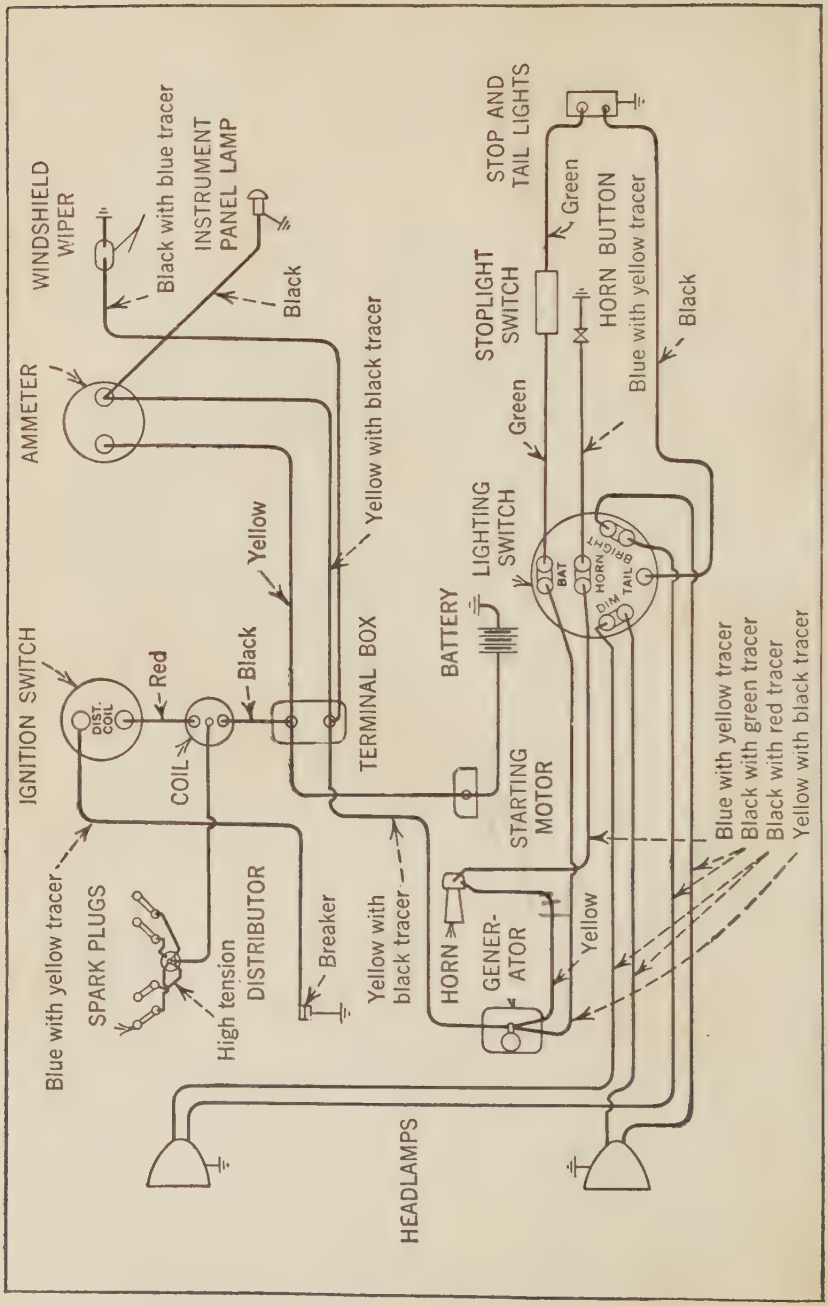


Fig. 28.—Wiring Diagram of the Ford Model A Showing All Units and Connections.

generator used in power houses. It is mounted on the left hand side of the engine. During winter months the charging rate should be adjusted to 14 amperes; in the summer this rate should be cut down to 10 amperes. The rate can, of course, be increased or decreased to meet individual requirements. For example, the owner who takes long daylight trips should cut down the charging rate to 8 amperes, to prevent the battery overcharging. On the other hand, the owner who makes numerous stops, should increase the normal rate if his battery runs down.

To increase or decrease the generator charging rate, remove generator cover and loosen field brush holder lock screw. The field brush holder can be easily identified, as it is the only one of the five brush holders that operates in a slot in the brush holder ring and which is provided with a locking screw. The remainder of the brush holders are riveted to the ring and are not movable. To increase the charging rate, shift the field brush holder in the direction of rotation; to reduce the rate shift the brush in the opposite direction. The output of the generator is indicated by the ammeter located on the instrument panel.

The starting motor is mounted on the left side of the engine. It requires no attention beyond seeing that the cable connection is clean and tight.

Ignition Coil.—The ignition coil mounted on the dash receives the low tension current from the battery, and transforms it into the high tension current necessary to produce the spark at spark plugs. Occasionally inspect the wire connections at the coil, distributor and spark plugs, to see that they are clean and tight. Loose connections cause misfiring.

The Spark Plugs.—The spark plugs are the medium through which the electric current ignites the gasoline charge in the cylinder. Hard starting or misfiring of the engine may be caused by dirty spark plugs or incorrect spark plug gaps. Keep the plugs clean and the gap set to .025 in. There is nothing to be gained by experimenting with different makes of spark plugs. The spark plugs with which Ford engines are equipped when they leave the factory are best adapted to the requirements of the Ford engine and have been determined to be so by exacting factory tests.

The Ammeter.—The ammeter is located on the instrument panel. It registers "charge" when the generator is charging the battery, and "discharge" when the lights are burning and the engine only running about 10 miles per hour. If the engine is running above 15 miles per hour and the ammeter does not register "charge," consult a Ford dealer or competent electrician specializing on automotive work.

Operation of the Lights.—The lighting system consists of a dash light, two head lamps and a combination tail and stop light, operated by a switch located at the top of the steering wheel. The headlamp bulbs are of the 6-8 volt, double filament gas-filled type. The major filament is 21 candle power. The small bulb used in the tail light, the instrument panel light, is of the 6-8 volt, single contact, three-candle power type. The stop lamp bulb is a single contact, 21 c.p. bulb. All of the lamps are connected in parallel so that the burning out or removal of any of them will not affect the others. Current for the lamps is supplied by the battery.

When replacing burned-out bulbs, make certain that you get genuine Ford bulbs, as satisfactory results can-

not be obtained with the many inferior bulbs now on the market. Genuine Ford bulbs have the name FORD marked on the base. They insure your headlights meeting the lighting requirements of the various states.

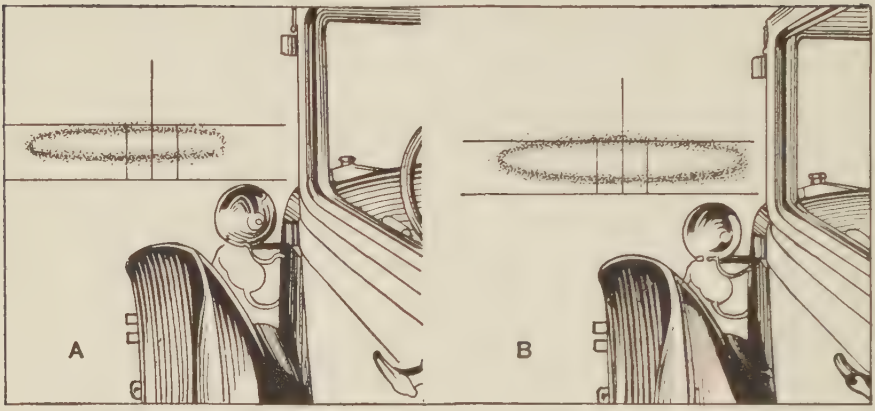
Headlamp Requirements.—When the car is delivered, the headlamps are properly focused and aligned, and will pass the lighting requirements of all states. Should the lamps get out of focus or alignment, they should immediately be focused and realigned. Ford dealers are equipped to do this work, or if you have the proper facilities you can make the adjustment.

Align and focus headlamps with empty car standing on a level surface in front of a white wall or screen 25 feet from front of headlamps. This wall must be in semi-darkness or sufficiently shielded from direct light so that the light spots from the headlamps can be clearly seen. The wall must be marked off with black lines, as shown in Fig. 29 A and B. Details for making the layout are shown in Fig 29 C.

To Focus.—Turn on bright lights. Focus by means of screw at back of lamps; keep one lamp covered while focusing the other. Adjust the bulb filament at the focal center of the reflector to obtain an elongated elliptical spot of light on the wall, with its long axis horizontal. (See Fig. 29 A.) In focusing, adjust the bulb to obtain as good contrast and as well-defined cut-off across the top of the spot of light as possible. With lamps thus focused for the "bright" filament, the "dim" will be in satisfactory position.

Alignment.—Loosen nut at bottom of bracket and tilt headlamps to desired angle.

The tops of the bright spots on the 25-foot wall are to be set at a line 33 inches above level of surface on



Left headlamp properly focused and aligned

Both headlamps properly focused and aligned

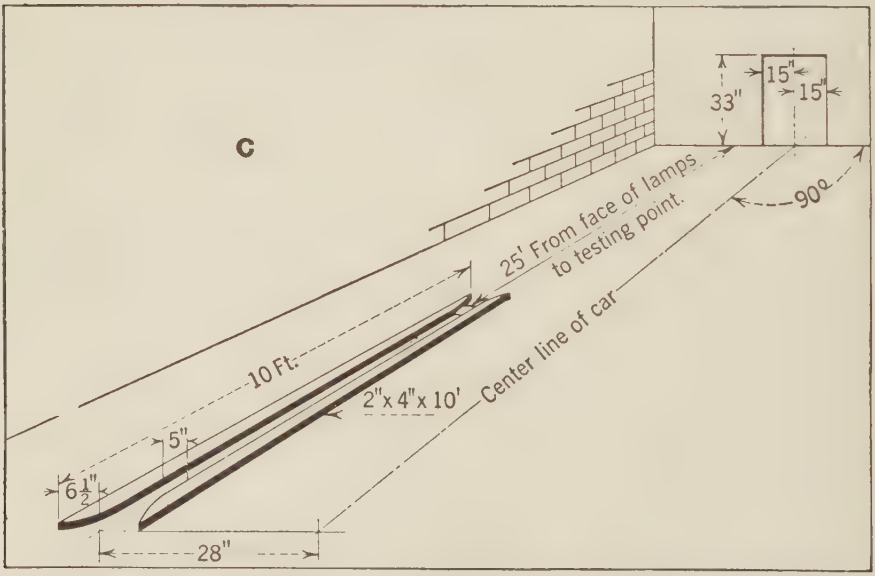


Fig. 29.—Methods of Focusing and Aligning Ford Model A Headlamps Shown at A and B. Shop Layout for Focusing and Adjusting Headlamps Shown at C.

which car stands. With top line thus set for empty car, the headlamps will also have the proper tilt under full loads, as required by the various states.

The beam of light from each headlamp is to extend straight forward: that is, the centers of the elliptical spots of light must be 30 inches apart.

Proper alignment of headlamps is readily checked by means of a horizontal line on the wall in front of the car, 33 inches above the level surface on which the car stands, and two vertical lines 30 inches apart, each one 15 inches from center line of car (see Fig 29 C). Proper alignment of car relative to marks on the wall may be readily provided by use of wheel guide blocks for one side of the car, as shown in Fig 29 C. If it is impossible to tie up the floor space required by these blocks, marks painted on the floor may be used to show where one set of wheels should track and where the car should be stopped. In order to avoid any confusion, the new layout can be painted with red paint and the old that is needed with model T painted with black.

Care of Running Gear.—Every few weeks the front and rear axles should be carefully gone over to see that all nuts and connections are tight, with cotter pins in place. The spring clips should be inspected occasionally to see that they are tight.

The front wheels should be jacked up periodically and tested for smoothness of running and excessive side play. To determine if there is excessive side play, grasp the sides of the tire and shake the wheel. Do not mistake loose spindle bushings for loose bearings. Insert a cold chisel between spindle and axle when making this test to take up any spindle bushing play.

Adjusting Front Wheel Bearing.—If there is excessive play in the bearing, it can be adjusted as follows:

Remove wheel.

Withdraw cotter key and tighten adjusting nut until the hub just starts to bind.

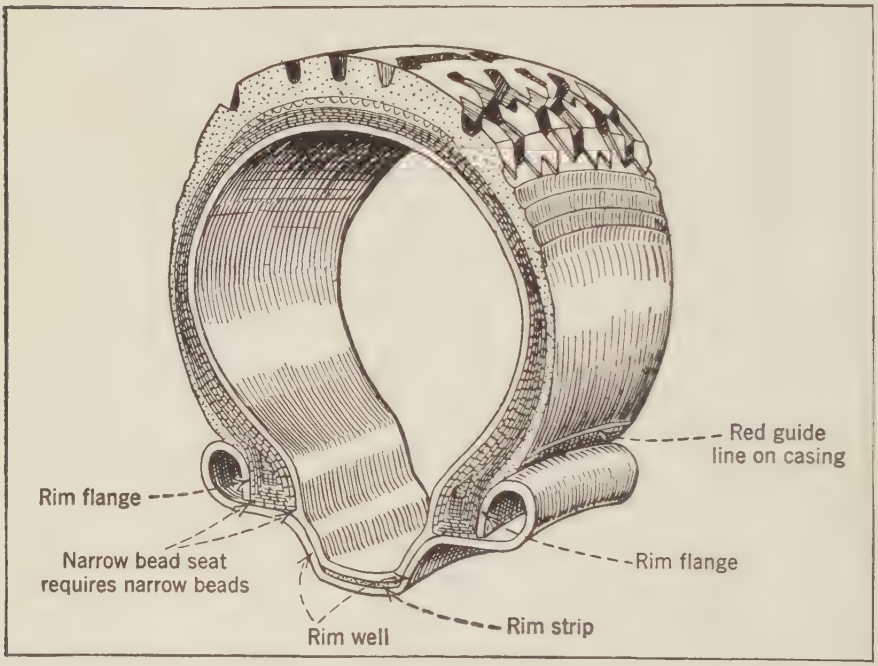


Fig. 30.—Sectional View Showing Drop Center Rim Used with Ford Wire Wheels and Balloon Tire Installed Thereon.

Then back off the adjusting nut one or two notches until the hub can be freely revolved.

Before placing the wheel, BE SURE TO INSERT COTTER KEY IN ADJUSTING NUT.

The springs should be lubricated occasionally with oil or graphite. This will restore the original flexibility of the springs and improve the riding quality of the car.

Ford Wire Wheels.—To remove the Ford wire wheels, jack up the side of the car from which the wheel is to be withdrawn and screw off the five hub bolt nuts. The wheel can then be removed. When replacing a wheel, tighten each hub bolt nut a few turns at a time. Then follow around hub, tightening each nut firmly. If nuts are not drawn up evenly, the wheel will not run true.

Removing Tires From Ford Wire Wheels (Drop Center Rims).—Remove valve cap and lock nut and place wheel so that the valve is at the top. Let all air out of tube. Push valve stem up into tire. Working both ways from the valve stem, press the casing together and down into the rim well, approximately one foot each side of the valve stem. Insert tire iron under both beads at point opposite valve and force tire over rim. The tire can be then removed from the wheel with the hands.

Mounting Tire on Ford Wire Wheels (Drop Center Rims).—Inflate tube until it is barely rounded out, and insert tube in casing. (CAUTION: Never use a tire flap when mounting tires on a Ford wire wheel.) With wheel placed so that valve stem hole is at top, place casing and tube on wheel, with valve in valve stem hole. (See Fig. 31 A.) Working both ways from the valve stem, press the casing together and down into the rim well, until lower part of casing can be forced over rim flange at bottom. A tire iron may be used, if necessary. (See Fig 31 B.) Raise tire up (see Fig. 31 C) until it is perfectly centered on rim and beads are seated on bead seats. Inflate tube to not more than two pounds pressure and work casing back and forth to insure proper setting of tire, indicated by red line on tire being equally spaced from rim all way around. (See Fig 31 D.) CAUTION: With Ford wire wheels (drop center rims) use only casing

with red centering line just above the rim flange, and tubes marked "for drop center rims."

It is particularly important that the red line (Fig.

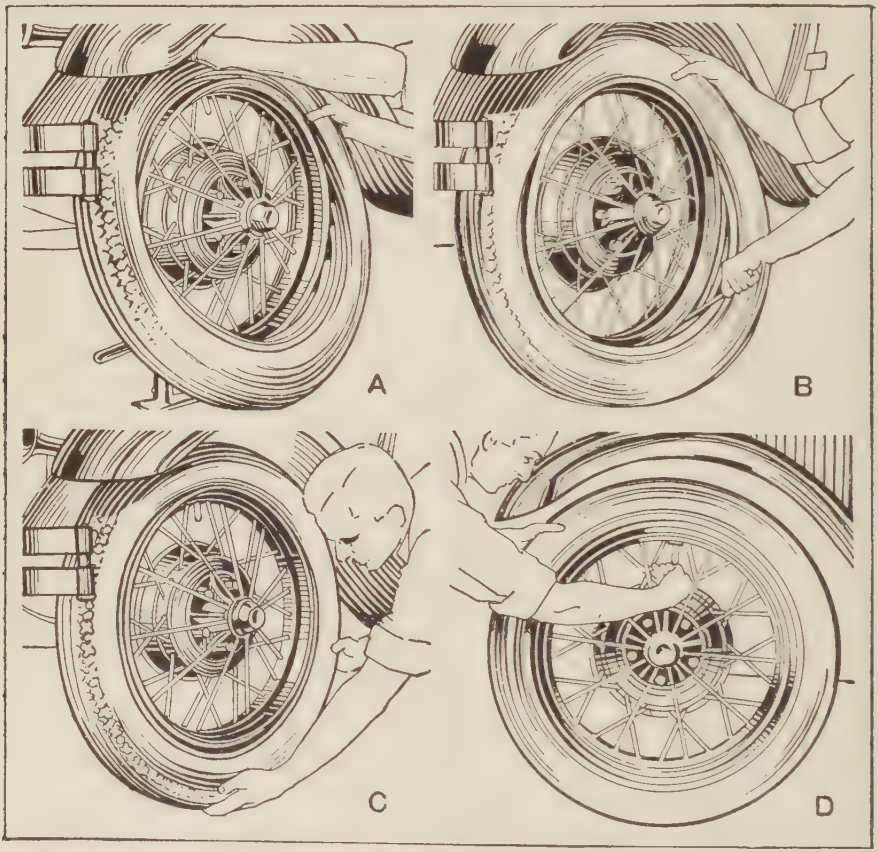


Fig. 31.—Sketches Showing Manipulation of Tire on Ford Drop Center Rim.

30) shows an even distance from the rim all around on both sides before fully inflating tire. Put valve nut on valve, inflate tire to 35 pounds and screw valve cap down tightly. (See Fig. 31 D.) With Ford wire wheels, tires

can be more easily changed with wheel mounted on axle or tire carrier than by laying the wheel down on ground.

Tires should never be run partially inflated, as the side walls are unduly bent and the fabric is subjected to stresses which cause what is known as rim cutting. KEEP BOTH FRONT AND REAR TIRES INFLATED TO 35 POUNDS AND CHECK THE PRESSURE ONCE A WEEK. Never run on a flat tire, even for a short distance. Skidding also shortens the life of the tires. Avoid locking the wheels with the brakes—no tire will stand the strain of being dragged over pavement. Avoid running in street car tracks, or bumping the sides of the tire against the curbing. To get most service at least expense, tires should be inspected frequently and all small cuts or holes properly sealed or repaired, thus preventing dirt and water working in between the rubber tread and the fabric, causing blisters or sand holes. The construction of Ford tire and drop side rim is clearly shown at Fig. 30.

When a car is idle for any appreciable length of time, it should be jacked up to take the load off the tires. If the car is laid up for several months, it is best to remove the tires. Wrap up the outer casings and inner tubes separately, and store them in a dark room, not exposed to extreme temperatures. Remove oil or grease from the tires with gasoline.

Brakes.—The braking system consists of four internal expanding brakes—one brake located within each wheel. The brakes are brought into operation by depressing the foot brake pedal or pulling back the hand brake lever. Each brake consists of two rigid shoes faced with lining; a hardened steel brake drum and special operating and adjusting parts. (See Fig. 32.) When the brakes are

applied the brake-shoes are expanded against the drum, the pressure of the shoes setting up a strong braking resistance which stops the car. An operating cam expand the shoes in the rear wheels, while in the front wheels a wedge is used.

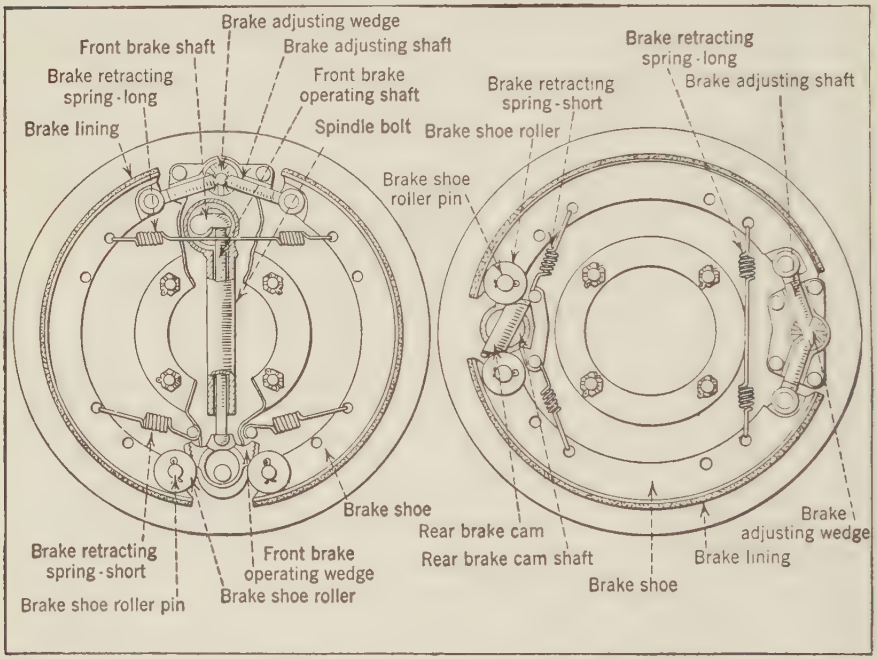


Fig. 32.—Parts of Ford Model A Internal Expanding Wheel Brakes and Shoe Spreading Mechanism.

Ordinary adjustments necessitated by natural wear of the linings are made as follows:

Jack up one wheel at a time and with the hand brake lever fully released turn the adjusting wedge (see Fig. 33) on each wheel until the wheel starts to bind. Then back off the adjusting wedge one notch, or until this wheel revolves freely. Each wheel should be adjusted in this

manner. When all of the adjustment on the adjusting wedges is used up, it will be necessary to reline the brakes. When this becomes necessary we suggest you take your car to an authorized Ford dealer. They are provided with special relining equipment.

UNDER NO CIRCUMSTANCES SHOULD OWN-

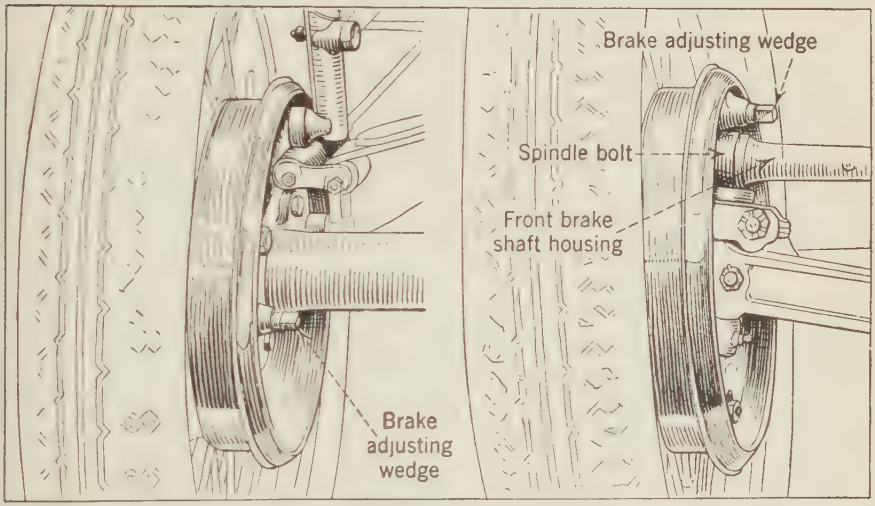


Fig. 33.—Where the Ford Model A Brake Adjusting Wedges Are Located.

ERS ATTEMPT TO MAKE ADJUSTMENTS BY TURNING UP THE CLEVISES ON THE BRAKE RODS, AS THIS WOULD RESULT IN THE BRAKES BEING THROWN OUT OF ADJUSTMENT AND CAUSE UNEQUAL WEAR ON THE LININGS.

Shock Absorbers.—Ford hydraulic double-acting shock absorbers operate entirely on the principle of hydraulic resistance, and are shown installed at Fig. 34. Glycerine is forced from one chamber to another by the movement of the lever arm. The working chamber is automatically kept full by the glycerine in the reservoir. As the shock

absorbers are accurately adjusted at the factory, it should not be necessary to alter this adjustment except in rare cases, where more or less shock absorber action is desired.

The reader will observe a needle valve with an arrow pointer extending through the center of the shaft. Surrounding it numbers from 1 to 8 are stamped. The average setting is with arrow pointing at 2 for the front

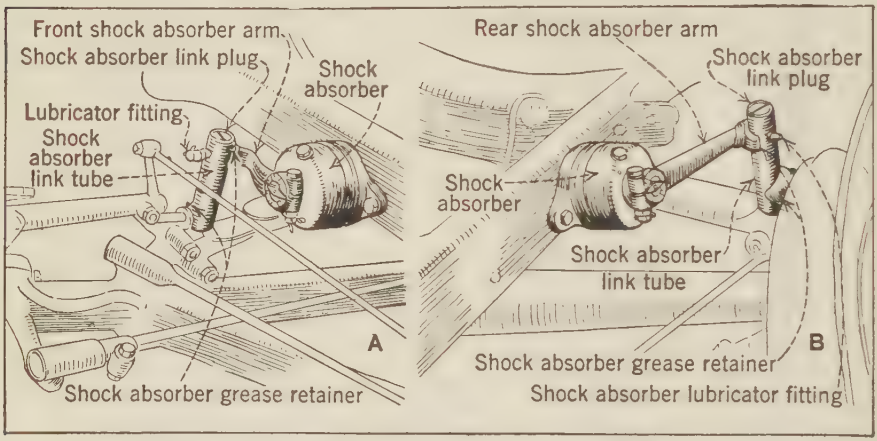


Fig. 34.—Location and Parts of Ford Model A Hydraulic Shock Absorbers.

shock absorbers and 3 for the rears. Turning the needle valve changes the adjustment. Resistance is increased when the needle valve is turned from 1 to 8 and decreased from 8 back to 1. A slight movement of the needle valve either way makes a big difference in the action of the instruments.

The only care the shock absorbers require is replenishing the glycerine in the reservoir and the lubrication of the ball joints. The filler plug in the reservoir should be removed at intervals of 5,000 to 10,000 miles, and the reservoir filled with glycerine (Commercial). NEVER

REPLENISH WITH OIL. Oil will solidify in the winter or reduce resistance, and will not mix with the glycerine in the instruments. In warm climates, replenish with glycerine, C. P. or Commercial. All instruments contain glycerine with 10% alcohol. Where temperatures of zero and below are prevalent, add additional alcohol, not to exceed 20% of the volume.

The ball joint in itself is made in unit with the instrument arm. It is hardened and ground. The ball joint seats are enclosed in the shock absorber connecting links, which should be lubricated every 500 miles with the compressor gun. In order to secure maximum riding comfort, it is important that the spring hangers be free in the bushings and kept well greased.

The speedometer with which the Ford Model A car is equipped indicates the speed and records the mileage of the car. It also helps the user in maintaining an accurate lubrication schedule. To reset the trip odometer, simply pull out the knob on the speedometer. By turning the knob you can reset the figures at any tenth of a mile desired, or back to zero. After resetting the odometer, be sure to push the knob back to its original position.

The flexible shaft should be lubricated every 5,000 miles. Care should be exercised not to bend the shaft in a radius smaller than 7 in. For maximum service we recommend that every 10,000 miles the speedometer be cleaned, lubricated and recalibrated. When this is necessary, or when repairs are required, consult an authorized dealer. All speedometers are sealed when they leave the factory. Under no circumstances should this seal be broken or repairs attempted by the owner.

The Proper Way to Wash the Car.—Always use cold or lukewarm water—never hot water. If a hose is used,

don't turn the water on at full force. This drives the dirt into the finish. After the surplus mud and grime have been washed off, take a sponge and clean the body and running gear with a solution of water and linseed oil soap. Rinse off with cold water; then rub and polish the body with a damp chamois skin. A body polish of good quality may be used to add luster to the car. Grease on the running gear may be removed with a gasoline-soaked sponge or rag. The nickeled parts may be polished with a good nickel polish. An excellent body polish and nickel polish can be purchased from any Ford dealer.

Should the body or other pyroxylin finished parts of the car become spattered with tar or other substances used on roads, the spots can be removed with a solution of two-thirds gasoline and one-third oil. If full strength gasoline is used, there is a possibility of softening the finish. Dip a soft cloth into the mixture and, using one finger, rub the spot gently until it has been removed. The rubbed spot should then be washed off with clear water.

Care of the Top.—When putting down the top be careful in folding to see that the fabric is not pinched between the bow spacers, as they will chafe a hole through the top very quickly. Applying Ford top dressing will greatly improve the appearance of an old top.

Storing the Car.—Drain the water from the radiator, then put in about a quart of anti-freeze solution to prevent any freezing of the water that may possibly remain. Draw off all gasoline. Drain the old oil from the oil pan. Refill the oil pan with one gallon of fresh oil and run the engine enough to cover the different parts with oil. Remove the tires and store them. Wash the car and, if possible, cover the body with a sheet of muslin to protect the finish.

FORD MODEL A ONE AND ONE-HALF TON TRUCK

The care and general operating instructions pertaining to the car also apply to the truck, with the exception that a new truck should not be driven faster than 20 to 25 miles per hour for the first 500 miles, and all tires

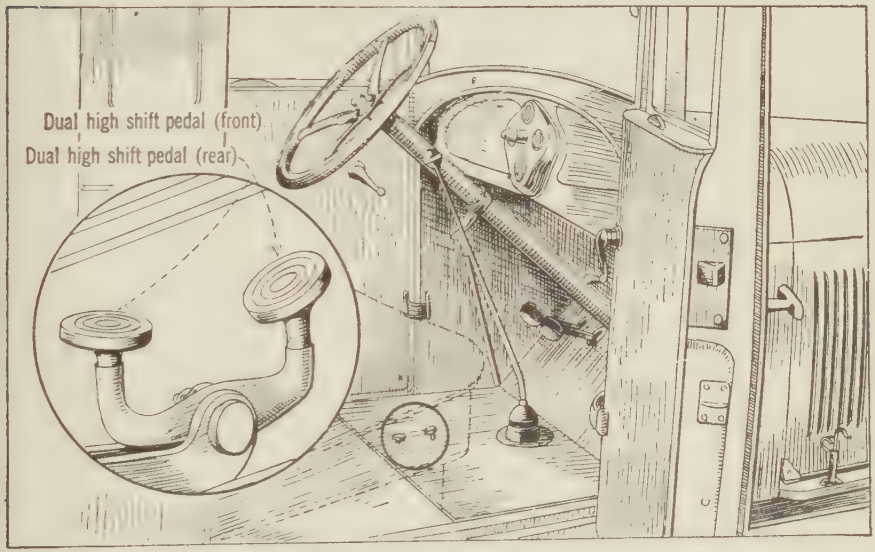


Fig. 35.—Location of Dual High Transmission Control Pedals on Ford Model AA Truck.

should be inflated to 80 pounds and the pressure checked every week.

Dual High.—The dual high transmission, which is optional equipment, gives the truck approximately one-third more pulling power. It is operated by a double end shift pedal which extends through the floor boards. Pressing down on the rear pedal engages the dual high. Pressing down on the front pedal disengages it. (See Fig. 35.)

This shift is entirely independent of any standard transmission gear shift and can be made at any speed in which the truck is being driven, whether high, second, low or reverse.

To engage the dual high remove your foot from the accelerator. Disengage the clutch, then press down on the rear dual high clutch pedal. As soon as the dual high is engaged, re-engage the clutch and press down on the accelerator until the desired driving speed is obtained.

To disengage the dual high, remove your foot from the accelerator. Disengage the clutch and press down on the front dual high clutch pedal. As soon as the dual high is disengaged, re-engage the clutch and press down on the accelerator until the desired driving speed is obtained.

SUMMARY OF FORD MODEL A ENGINE TROUBLES AND THEIR CAUSES

If starter turns engine over freely, check the following:

Ignition switch off.

Gasoline tank is empty or supply shut off.

If engine is cold, mixture may not be rich enough—choke button not pulled back. See starting instructions.

Warm engine—over-choking.

Breaker points too close. The correct adjustment is .015 to .018 in.

Spark plugs gaps too wide. Correct gap .025 in.

Water in sediment bulb or carburetor. See instructions for draining carburetor.

Starter Fails to Turn Engine Over.—Battery run down. A quick way to check this is to turn on the lights, and

depress the starter switch. If the battery is weak the lights will go out or grow quite dim. If the battery is run down, have it recharged.

Loose or dirty battery connections—see that both the negative and positive battery terminal connections are clean and tight. These connections should be checked regularly.

Missing at Low Speed. —Gas mixture too rich or too lean. See carburetor adjustment on page 547.

Too close a gap between spark plug points. The correct gap is .025 in.

Breaker points improperly adjusted, badly burnt or pitted. See instructions for adjusting breaker contact points. Fouled spark plug. Plugs should be occasionally cleaned and the gaps checked. Water in gasoline. See instructions on cleaning sediment bulb and carburetor.

Missing at High Speed. — Insufficient gasoline flowing to carburetor due due to gasoline line filter screen being partly clogged. Gas mixture too rich or too lean. See carburetor adjustment instructions. Water in gasoline. Drain sediment bulb and carburetor as described.

Engine Stops Suddenly.—Gasoline tank empty. Dirt in fuel line or carburetor. Gas mixture too lean.

Engine Overheats. —Lack of water—radiator should be kept well filled. Lack of oil—check oil level as described. Fan belt loose or slipping. See instructions for fan belt adjustment. Carbon deposit on piston heads and in combustion chamber. This can be corrected by taking off the cylinder head and removing the carbon. (Ford dealers are equipped for this work.) Incorrect spark timing. Follow ignition timing instructions. Gas mixture too rich. See instructions for adjustment of carburetor. Water circulation retarded by sediment in radiator.

Engine Knocks.—Carbon knock—caused by a deposit of carbon in combustion chamber and on piston heads. Take off cylinder head and remove carbon. Ignition knock—if this occurs under ordinary driving conditions, check ignition timing. Engine overheats. Check conditions listed under "Engine Overheats." Loose bearing. If a bearing has become loose, it should be adjusted by an authorized Ford mechanic.

Do not mistake an ignition knock for a loose bearing. Ignition knocks usually occur when the car is suddenly accelerated or when ascending a steep grade or traveling through heavy sand with the spark lever fully advanced. Slightly retarding the spark lever eliminates the knock. The spark should be advanced as soon as normal road conditions are encountered. Loose bearings knock all the time the engine is in use and regardless of spark timing.

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